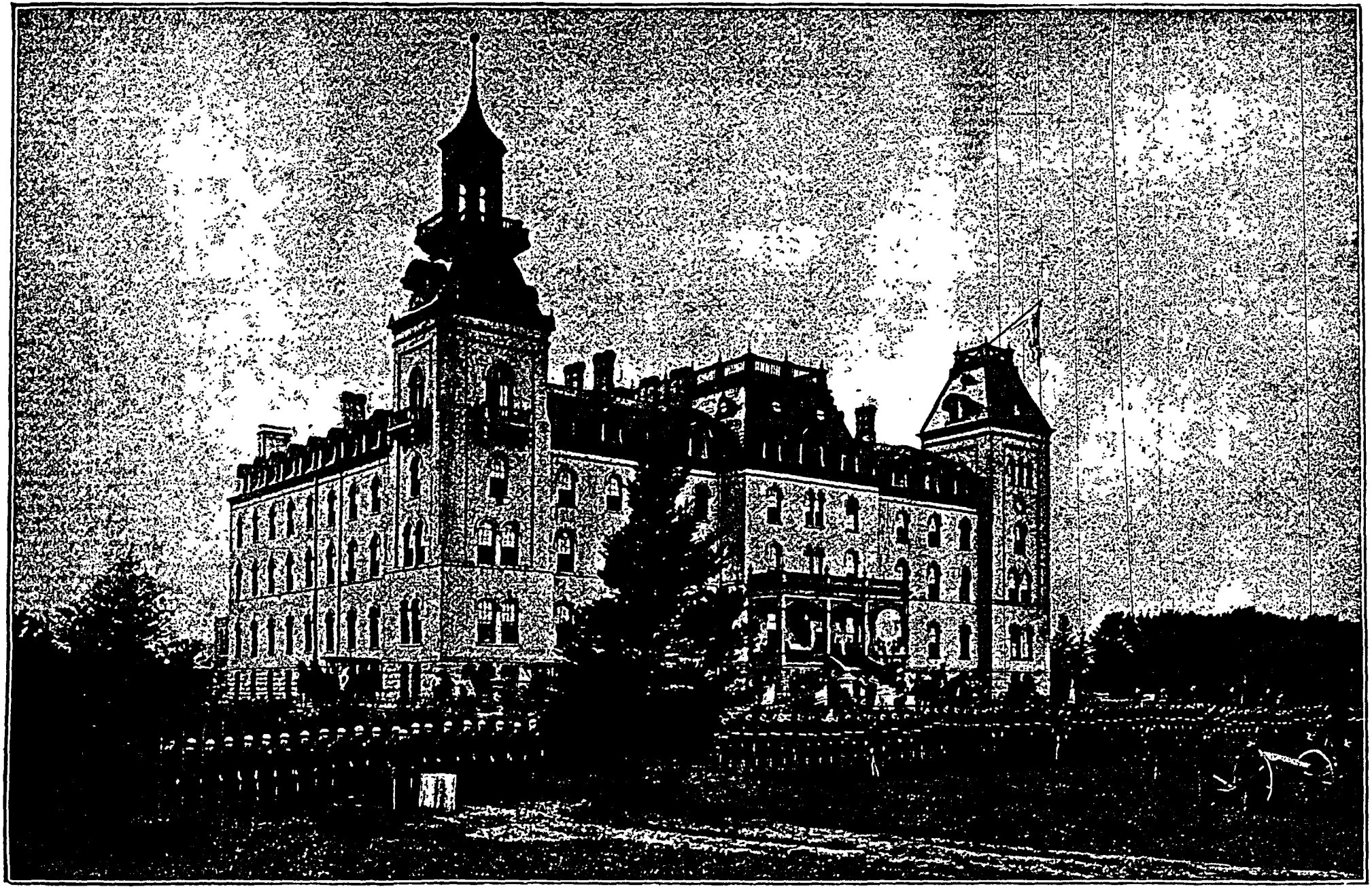
1889

Iowa State College of Agriculture and Mechanic Arts

Iowa State University



Main College Building and College Battalion.

IOWA STATE COLLEGE

OF

AGRICULTURE AND MECHANIC ARTS.

CATALOGUE,

1889.

"SCIENCE WITH PRACTICE."

1889.
BY THE COLLEGE.
AMES.

1889.

JANUARY.

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1890.

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DES MOINES, IOWA:
REGISTER PRINTING HOUSE
1889.

CALENDAR FOR 1889.

Term opened	Wednesday, February 27.
Entrance Examinations	Wednesday, February 27. Thursday, February 28.
Recitations began	Friday, March 1.
Centennial of the Constitution	Tuesday, April 30.
Decoration Day	Thursday, May 30.
Term Examinations	June 13 to 19.
Junior Exhibition	Wednesday, June 19.
Second Term began	Wednesday, June 17.
Entrance Examinations	Wednesday, July 17. Thursday, July 18.
Recitations began	Friday, July 19.
Term Examinations	November 6 to 13.
Baccalaureate Sermon	Sunday, November 10.
Address before Trustees	Tuesday evening, Nov. 12.
Commencement Exercises	Wednesday, November 13
Winter Vacation from November 13, 1889, to	February 25, 1890.

CALENDAR FOR 1890.

First Term opens	Tuesday, February 25.
Entrance Examinations	Tuesday, February 25. Wednesday, February 26.
Recitations begin	Thursday, February 27.
Decoration Day	Friday, May 30.
Term Examinations	June 11 to 18.
Junior Exhibition	Wednesday, June 18.
Field Sports and Competitive Military Drill	Wednesday, June 18.
Second Term begins	Tuesday, July 15.
Entrance Examinations	Tuesday, July 15. Wednesday, July 16.
Recitations begin	Thursday, July 17.
Term Examinations	November 5 to 12.
Baccalaureate Sermon	Sunday, November 9.
Address before Trustees	Tuesday evening, Nov. 11.
Commencement Exercises	Wednesday, November 12.
Winter Vacation from November 12, 1890, to	February 24, 1891.

BOARD OF TRUSTEES.

	Term Expires.
First District—Hon. J. W. Garner, Columbus City,	1892
Second District—Hon. C. M. Dunbar, Maquoketa,	1892
Third District—Hon. G. W. Dunham, Manchester.	1890
Fourth District—Hon. S. P. Yeomans, Charles City,	1892
Fifth District—Hon. Joseph Dysart, Dysart,	1894
Sixth District—Hon. John Morrison, Hedrick,	1890
Seventh District—Hon. J. S. Clarkson, Des Moines,	1894
Eighth District—Hon. Geo. Van Houten, Lenox,	1892
Ninth District—Hon. Platt Wicks, Harlan,	1890
Tenth District—Hon. Eugene Secor, Forest City,	1894
Eleventh District—Hon. C. D. Boardman, Odebolt,	1894

OFFICERS OF THE BOARD.

Hon. Joseph Dysart, Dysart,	*Chairman.*
E. W. Stanton, Ames,	*Secretary.*
Herman Knapp, Ames,	*Treasurer.*
J. R. Lincoln, Ames,	*Steward.*

MEETINGS.

The annual meeting of the Board of Trustees is held on the second Wednesday of November: also a second meeting in May, and others if occasion requires

STANDING COMMITTEES OF THE BOARD OF TRUSTEES.

Executive and Finance Committee—Trustees Wicks, Yeomans, Dunham, Secor and Van Houten.

Committee on Faculty and Courses of Study—Trustees Clarkson, Morrison, Dunbar, Boardman and Dysart.

Committee on Farm and Farm Buildings—Trustees Secor, Boardman and Dunbar.

Committee on Horticulture, Experiments and Hybridizing—Trustees Van Houten, Yeomans and Boardman.

Committee on Workshop—Trustees Dunbar, Clarkson, Dunham and Morrison.

Committee on College Lands—Trustees Morrison, Boardman and Secor.

Building Committee—Trustees Garner, Dunham and Van Houten.

Committee on Investments—Trustees Yeomans, Dunham and Secor.

Committee on Library—Trustees Clarkson, Van Houten and Dysart.

Committee on Rules—Trustees Dunbar, Morrison and Secor.

Committee on Bonds—Trustees Dunham and Wicks.

Committee on Domestic Economy—Trustees Boardman, Yeomans and Morrison.

Committee on Experiment Station—Trustees Garner, Dunbar and Dysart.

Committee on Scientific Departments—Trustees Clarkson, Yeomans and Boardman.

Dr. A. S. Welch.

Dr. A. S. Welch, first President of the Iowa Agricultural College, died at Pasadena, California, March 14, 1889. He was born in East Hampton, Connecticut, April 12, 1821. At the age of eighteen years he emigrated to Michigan, and prepared himself to enter the University of that State at the Academy at Romeo. He was admitted to the University in 1843, and graduated in 1846. During the last two years of his course he had charge of the Preparatory Department of the University, where by successful work he laid the foundation of his great reputation as a teacher. In 1847 he was elected principal of the school at Jonesville—the first union or graded school established in Michigan. So marked was his success in the conduct of this school, and so strongly did he impress himself upon the public school system of the State, that in 1851 he was offered and accepted the principalship of the State Normal School at Ypsilanti, Mich. He remained at the head of this institution for fifteen years. In the management of its affairs he displayed an executive power and an ability as an instructor and disciplinarian which placed him in the first rank of educators. He rendered services of the highest value in the general upbuilding of the educational system of Michigan. He conducted teachers' institutes and lectured on education in all parts of the State; he organized the State Teachers' Association, serving as its first president, and being for many years prominent in its management. As trustee of the Michigan Agricultural College, he became greatly interested in industrial education. Leaving the Normal School in 1865, because of impaired health, he removed to Florida, seeking rest and renewed strength in a change of climate. He was elected to the United States Senate from that State in 1867. In the following year he terminated his Senatorial career in order to accept the Presidency of the Iowa Agricultural College The charter and seal of the institution were formally delivered into his hands March 17, 1869, but he had already outlined a course of study and prepared a plan of organization which had been submitted to and approved by the Board of Trustees. Able, faithful, vigilant, he proved himself thoroughly competent to guide the institution safely through the difficulties and vicissitudes of its early years. His cultured taste projected its beautiful grounds; his executive ability organized its departments, and his far-seeing wisdom planned its courses of study. The fifteen years of his presidency saw the College advanced to the front rank of industrial institutions Resigning the presidency in 1884, he was in the following year elected Professor of Psychology and History of Civilization, which position he continued to hold with pleasure to himself and great profit to the institution until his death.

Dr. Welch received from the University of Iowa in 1873 the degree of Doctor of Laws, and in 1878 the University of Michigan conferred upon him the same high honor. He was the author of several educational works, among which are "An Analysis of the English Sentence," "A Treatise Upon Object Lessons," "Talks on Psychology," and "Psychology for Teachers."

Dr. Welch was a born executive, a ripe scholar, a natural educator. His well rounded character and generous, kindly disposition won the respect and confidence of his associates, and the love and reverence of his students. For the great work he has wrought in the upbuilding of this institution, his name will be held in grateful and lasting remembrance. In affectionate appreciation of that work this memorial page is, by the vote of the Faculty, dedicated to his memory.

OFFICERS OF INSTRUCTION.

W. I. CHAMBERLAIN, A. M., LL. D., PRESIDENT,
Professor of Psychology, Ethics and Civics.

A. S. WELCH, A. M., LL. D.,*
Professor of Psychology and History of Civilization.

M. STALKER, M. Sc., V. S.,
Professor of Veterinary Science.

J. L. BUDD, M. H.,
Professor of Horticulture.

E. W. STANTON, M. Sc.,
Professor of Mathematics and Political Economy.

D. S. FAIRCHILD, M. D.,
Professor of Pathology, Histology, Therapeutics and Comparative Anatomy.

C. F. MOUNT, C. E.,
Professor of Civil Engineering.

CAPT. JAMES RUSH LINCOLN,
Professor of Military Science and Tactics.

ALFRED A. BENNETT, M. Sc.,
Professor of Chemistry.

HERBERT OSBORN, M. Sc.,
Professor of Zoology and Entomology.

J. C. HAINER, B. Sc., M. D.,
Professor of Physics.

A. C. BARROWS, A. M., D. D.,
Professor of English Literature and History.

LOREN P. SMITH, M. Sc.,
Professor of Agriculture and Farm Superintendent.

MISS LILLIE M. GUNN,
Preceptress and Professor of French and German.

C. W. SCRIBNER, A. B., M. E.,
Professor of Mechanical Engineering.

L. H. PAMMEL, B. AGR.,
Professor of Botany.

*Deceased March 13, 1889.

MRS. ELIZA OWENS,
Instructor in Domestic Economy.

MISS CORA MARSLAND, O. B.,
Librarian and Instructor in Elocution.

MISS EVA F. PIKE,
Organist and Instructor in Vocal and Instrumental Music.

A. J. WEICHARDT, M. E.,
Foreman and Instructor in Machine Shops.

E. A. KIRKPATRICK, B. Sc.,
Assistant in English Composition, Rhetoric and Mathematics.

L. F. KEBLER,
Assistant in Chemistry.

JOHN McBIRNEY,
Acting House Surgeon

F. A. WEIHE, M. E.,
Assistant in Drawing.

NON-RESIDENT LECTURERS.

F. E. CRUTTENDEN, M. D.,
Ophthalmology.

LOUIS SCHOOLER, M. D.,
Surgical Therapeutics.

OFFICERS OF THE EXPERIMENT STATION.

HON. J. W. GARNER, HON. JOSEPH DYSART,

HON. C. M. DUNBAR,

Committee of the College Board of Trustees on Experiment Station.

R. P. SPEER, Director.

HERMAN KNAPP, Treasurer.

G. E. PATRICK, M. Sc., Chemist.

C. P. GILLETTE, M. Sc., Entomologist.

ALFRED A. BENNETT, M. Sc., Chemist (Special Work).

L. H. PAMMEL, B. Agr., Botanist (Special Work).

J. L. BUDD, M. H., Horticulture (Special Work).

LOREN P. SMITH, M. Sc., Agriculture (Special Work).

M. STALKER, M. Sc., Veterinary Science (Special Work).

MRS. ELIZA OWENS,
Instructor in Domestic Economy.

MISS CORA MARSLAND, O. B.,
Librarian and Instructor in Elocution.

MISS EVA F. PIKE,
Organist and Instructor in Vocal and Instrumental Music.

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Assistant in Drawing.

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Ophthalmology.

LOUIS SCHOOLER, M. D.,
Surgical Therapeutics.

OFFICERS OF THE EXPERIMENT STATION.

HON. J. W. GARNER, HON. JOSEPH DYSART,

HON. C. M. DUNBAR,

Committee of the College Board of Trustees on Experiment Station.

R. P. SPEER, Director.

HERMAN KNAPP, Treasurer.

G. E. PATRICK, M. Sc., Chemist.

C. P. GILLETTE, M. Sc., Entomologist.

ALFRED A. BENNETT, M. Sc., Chemist (Special Work).

L. H. PAMMEL, B. Agr., Botanist (Special Work).

J. L. BUDD, M. H., Horticulture (Special Work).

LOREN P. SMITH, M. Sc., Agriculture (Special Work).

M. STALKER, M. Sc., Veterinary Science (Special Work).

LIST OF STUDENTS, 1889.

RESIDENT GRADUATES.

NAME.	DEGREE.	POST OFFICE.	COUNTY.
Kirkpatrick, Edwin A.,	B. Sc., M. Ph.,	Ames,	Story.
Malley, Frederick W.,	B. Sc., M. Sc.,	Des Moines,	Polk.

—Resident Graduates 2.

SENIORS.

NAME.	COURSE.	POST OFFICE.	COUNTY.
Baker, James A.,	*G.,	Rhodes,	Marshall.
Banks, J. Edwin,	†C. E.,	Knoxville,	Marion.
Beyer, Samuel W.,	G.,	Manly,	Worth.
Bisbee, Derward B.,	G.,	Ames,	Story.
Budrow, William B.,	G.,	Ogden,	Boone.
Chamberlain, Herbert W.,	G.,	Ames,	Story.
Cooley, Frank H.,	C. E.,	Truro,	Madison.
Day, Harry B.,	‡M. E.,	Des Moines,	Polk.
Durkee, Joseph E.,	G.,	Floyd,	Floyd.
Gossard, Harry A.,	G.,	Ames,	Story.
Graham, A. Louis,	M. E.,	Atlantic,	Cass.
Green, Burtis T.,	G.,	Little Rock,	Lyon.
Hensen, William R.,	G.,	Denison,	Crawford.
Johnson, Nellie,	‖L.,	Alton,	Sioux.
Kelsey, James A.,	G.,	Dunlap,	Harrison.
Kimball, Clement F.,	M. E.,	Anamosa,	Jones.
Lamborn, Charles W.,	C. E.,	Elliott,	Montgomery.
McClelland, Albert,	G.,	North Des Moines,	Polk.
McLaughlin, Angus A.,	G.,	Webster City,	Hamilton.
McPherson, Albert,	G.,	Oelwein,	Fayette.
Meissner, John A.,	G.,	Reinbeck,	Grundy.
Morris, Seward,	G.,	Brooks,	Adams.
Newell, Belle,	L.,	Woodward,	Dallas.
Nichols, Ira A.,	G.,	Glidden,	Carroll.
Rickard, William U.,	C. E.,	Humboldt,	Humboldt.
Rolfs, P. Henry,	G.,	Le Claire,	Scott.
Schoenleber, John,	M. E.,	Grant,	Montgomery.
Scott, William U.,	G.,	Slater,	Story.

* G.—Stands for General Course in Science and Agriculture.
† C. E.—Course in Civil Engineering.
‡ M. E.—Course in Mechanical Engineering.
‖ L.—Ladies Course.

NAME.	COURSE.	POST OFFICE.	COUNTY.
Shelton, John A.,	G.,	Abingdon,	Jefferson.
Shoemaker, William R.,	G.,	Muscatine,	Muscatine.
Snyder, Virgil,	G.,	Dixon,	Scott.
Starr, Palmer W.,	C. E.,	Carson,	Pottawatamie.
Stearns Charles H.,	G.,	Ames,	Story.
Stroud, John S.,	G.,	Linden,	Dallas.
Thornburg, Matthew W.,	G.,	Panora,	Guthrie.
Thurlimann, Rosalia L.,	L.,	Ames,	Story.
Wade, Charles M.,	G.,	Stanwood,	Cedar.
Zimbelman, Mary C.,	L.,	Boone,	Boone.

—Seniors 88.

VETERINARY.

Ashworth, Charles A.,	Ashawa,	Polk.
Bousquet, Abraham E. D.,	Pella,	Marion.
Geddes, T. Alexander,	Ames,	Story.
McBirney, John,	Conrad,	Grundy.
Nelson, Sofus B.,	Avoca,	Pottawatamie.
Platt, John H.,	Montezuma,	Poweshiek.
Reynolds, Myron H., B. S. A.,	Shellsburg,	Benton.
Simcoke, Joseph O.,	Stuart	Adair.

—Senior Veterinary Students 8.

—Total Seniors 46.

JUNIORS.

Bannister, Nettie,	L.,	Cherokee.	Cherokee.
Bolles, William E.,	C. E.,	Ridgeway,	Winneshiek.
Bond, George P.,	G.,	Lehigh,	Webster.
Bramhall, John A.,	M. E.,	Carlisle,	Warren.
Brandvig, Meyer,	G.,	Story City,	Story.
Buell, Hardy O.,	G.,	Algona,	Kossuth.
Carter, Donald M.,	M. E.	Orange City,	Sioux.
Chamberlain, Joseph S.,	G.,	Ames,	Story.
Crosby, Herbert E.,	G.,	Floyd,	Floyd.
Davidson, Frank E.,	C. E.,	Batavia,	Jefferson.
Davidson, Charles D.,	M. E.	Monticello,	Jones.
Dewell, William C.,	G.,	Magnolia,	Harrison.
Eaton, Edward N.,	G.,	Keota,	Keokuk.
Eustis, George D.,	M. E.,	Aplington,	Butler.
Fellows, Mary E.,	L.,	Montour,	Tama.
Georgen, John,	G.,	Rockville,	Delaware.

NAME.	COURSE.	POST OFFICE.	COUNTY.
Graham, J. Melville,	G.,	Audubon,	Audubon.
Hardy, May,	L.,	Ames,	Story.
Haven, Spencer,	G.,	Charles City,	Floyd.
Henely, Eugene,	G.,	Monticello,	Jones.
Howard, T. Sigel,	G.,	East Des Moines,	Polk
Howell, Sylvester S.,	M. E.,	Iowa City.	Johnson.
Kerr, Thomas S.,	G.,	Cincinnati,	Appanoose.
Kreger, Edward A.,	G.,	Keota,	Keokuk.
Mann, Alice,	G.,	Algona,	Kossuth.
Mann, Bertha,	G.,	Algona,	Kossuth.
McCuskey, Henry B.,	C. E.,	Defiance,	Shelby.
Mills, Ada,	L.,	Jefferson,	Greene.
Olmsted, Robert W.,	G.,	Milan,	*Illinois.*
Perry, Joseph M.,	M. E.,	Jefferson,	Greene.
Quint, Violet U.,	L.,	Carroll,	Carroll.
Roberts, Minnie,	L.,	Dunlap,	Harrison.
Schulte, George Henry,	G.,	Clayton,	Clayton.
Shaul, William H.,	G.,	Millersburg,	Iowa.
Sirrine, F. Atwood,	Ag.,	Dysart,	Tama.
Smith, C. Tenney,	M. E.,	Ames,	Story.
Stevens, Kate,	L.,	Mason City,	Cerro Gordo.
Stinson, John T.,	G.,	Red Oak,	Montgomery.
Thurlimann, Edward,	G.,	Ames,	Story.
Thurlimann, Leo.,	G.,	Ames,	Story.
Yeisley, Matie,	C. E.,	Woodbine,	Harrison.

—Juniors 41.

VETERINARY.

Knowles, Clifton B.,	James Station,	Plymouth.
McLaughlin, James J.,	Webster City,	Hamilton.
Williams, Albert R.,	Glenwood,	Mills.

—Junior Veterinary Students 3.

—Total Juniors 44.

SOPHOMORES.

Angus, George S.,	C. E.,	Burt,	Kossuth.
Ashford, George,	C. E.,	Nevada,	Story.
Ballreich, Charles A.,	G.,	Des Moines,	Polk.
Barrows, Sahrah T.,	L.,	Ames,	Story.
Bowne, Frank J.,	C. E.,	Sheldon,	O'Brien.
Brown, George W.,	G.,	Boone,	Boone.

NAME.	COURSE.	POST OFFICE.	COUNTY.
Christy, George L.,	C. E.,	Des Moines,	Polk.
Clarke, Clinton C.,	G.,	Potter,	Tama.
Colton, Fred M.,	G.,	Columbus City,	Louisa.
Cottrell, Carrie L.	L.,	Woodward,	Dallas.
Cottrell, May.	L.,	Woodward,	Dallas.
Dean, Harry A.,	C. E.,	Arcadia,	Carroll.
DeCou, Frank H.,	G.,	Woodbine,	Harrison.
Dow, W. Newton,	M. E.,	College Springs,	Page.
Dyer, Robert M.,	M. E.,	Pleasant Valley,	Scott.
Emerson, Loyd L.,	G.,	Stratford,	Hamilton.
Fairchild, David S.,	C. E.,	Ames,	Story.
Finn, Charles F.,	M. E.,	Radcliffe,	Hardin.
Gilchrist, Annie L.,	L.,	Dunlap,	Harrison.
Heileman, William H.,	G.,	Elwell,	Story.
Hinds, Rollin E.,	C. E.,	Ottumwa,	Wapello.
Howe, Frank D.,	M. E.,	Ames,	Story.
Hudson, Edwin P.,	G.,	Sheffield,	Franklin.
Hutton, Thomas P.,	G.,	Des Moines,	Polk.
Jackson, William H.,	C. E.,	Waukee,	Dallas.
Jaquiss, Daisy,	L.,	Cincinnati,	Appanoose.
Johnson, Charles W.,	G.,	Ontario.	Story.
Jones, Clyde,	M. E.,	Keokuk,	Lee.
Jones, Edwin D.,	C. E.,	Sharpsburg,	Taylor.
King, Edwin S.,	G.,	Fifteen Mile,	Tama.
King, Nellie,	L.,	Fifteen Mile,	Tama.
Lovejoy, Alva B.	G.,	Rock Creek,	Mitchell.
McNaughton, Louis D.,	M. E.,	Charles City,	Floyd.
Meek, William H.,	G.,	Polk City.	Polk.
Mills, Ella,	L.,	Jefferson,	Greene.
Moore, John H.,	C. E.,	Hedrick,	Keokuk.
Morrison, John,	C. E.,	Hedrick,	Keokuk.
Moss, Berkley N.,	C. E.,	Brownville,	Mitchell.
Nichols, Mary A.,	L.,	State Center,	Marshall.
Ockerson, C. Linneus,	C. E.,	Red Oak,	Montgomery.
Oggel, E. Christian,	G.,	Orange City,	Sioux.
Porter, Edward H ,	G.,	Woodbine,	Harrison.
Reynolds, Norton B.,	C. E.,	Agency,	Wapello.
Richman, May S.,	L.,	Muscatine,	Muscatine.
Rickard, Hugh B.,	C. E.,	Humboldt,	Humboldt.
Rickey, Millard L.,	G.,	Wellman,	Washington.
Roddis, May,	L.	Cherokee,	Cherokee.
Schulte, J. Fred,	G.,	Clayton,	Clayton.
Shaum, Benjamin F.,	C. E.,	Columbus City,	Louisa.
Shepperd, John H.,	G.,	Chariton,	Lucas.

NAME.	COURSE.	POST OFFICE.	COUNTY.
Smith, A. J.,	G.,	Webster City,	Hamilton.
Spaan, John,	G.,	Orange City,	Sioux.
Steele, Walter D.,	M. E.,	Keokuk,	Lee.
Swift, Willis C.,	M. E.,	Charles City,	Floyd.
Thornburg, D. A.,	G.,	Orchard,	Mitchell.
Woods, Charles M.,	G.,	Woodward,	Dallas.
			—Sophomores 56.

FRESHMEN.

Allen, Herbert,	G.,	Independence,	Buchanan.
Andruss, Clifford J.,	G.,	Dallas,	*Texas.*
Barrows, Charlotte L.,	L.,	Ames,	Story.
Beach, Edwin L.,	M. E.,	Davenport,	Scott.
Benjaman, Reuben B.,	M. E.,	Clark,	*Dakota.*
Blaine, Estella,	L.,	Polk City,	Polk.
Blanchard, Lelia,	L.,	Russell,	Lucas.
Bonwell, Albert N.,	G.,	Clarksville,	Butler.
Bowman, Edith C.,	L.,	Earlville,	Delaware.
Boyd, Emma H.,	L.,	Paullina,	O'Brien.
Boyer, Howard J.,	G.,	Red Oak,	Montgomery.
Brooks, George S.,	G.,	Hedrick,	Keokuk.
Brown, G. Eugene,	G.,	Mason City,	Cerro Gordo.
Campbell, Zenas M.,	C. E.,	Panora,	Guthrie.
Clinton, Ellsworth E.,	C. E.,	Eldora,	Hardin.
Corry, Edgar C.,	G.,	Auburn,	Sac.
Culver, Genevieve R.,	L.,	Audubon,	Audubon.
Dailey, Rania,	L.,	Ames,	Story.
Day, Edwin S.,	G.,	Des Moines,	Polk.
Dean, Annie,	L.,	E. Des Moines,	Polk.
Deering, Charles C.,	M. E.,	Boone,	Boone.
Duncan, Ruth,	L.,	Ames,	Story.
Emry, Clarence,	G.,	Brighton,	Washington.
Fellows, R. F.,	G.,	Milo,	Warren.
Ford, Alice,	L.,	Woodbine,	Harrison.
Foster, George S.,	C. E.,	Humboldt,	Humboldt.
Freed, Kittie B.,	L.,	Ontario,	Story.
George, Clarence S.,	G.,	Independence,	Buchanan.
Gilbert, E. P.,	G.,	Ames,	Story.
Goldschmidt, Adolph,	G.,	LeClaire,	Scott.
Graham, Edwin C.,	G.,	Whitten,	Grundy.
Greenwood, Frank J.,	G.,	Stratford,	Hamilton.
Hainer, Vesta,	L.,	Aurora,	*Nebraska.*

NAME.	COURSE.	POST OFFICE.	COUNTY.
Henry, Eugene B.,	C. E.,	Sheldon,	O'Brien.
Hicks, William C.,	G.,	Brighton,	Washington.
Hollenbeck, Benjamin F.	M. E.,	Sheldon,	O'Brien.
Hollenbeck, Louis C.,	M. E.,	Sheldon,	O'Brien.
Hudson, Jessie,	L.,	Coldwater,	Franklin.
Jones, James F.,	G.,	Ontario,	Story.
Kaufman, Elmer E.,	G.,	Massena,	Cass.
Kelley, Leonard G.,	M. E.,	Deep River,	Poweshiek.
Knapp, S. Arthur,	G.,	Ames,	Story.
Knight, Warren M.,	G.,	Monroe,	Jasper.
Lawson, Hugh,	G.,	Hedrick,	Keokuk.
Mally, Charles W.,	G.,	Des Moines,	Polk.
Maxwell, Jessie,	L.,	Ames,	Story.
McCulloch, Jesse H.,	G.,	Mason City,	Cerro Gordo.
McPherson, Robert,	M. E.,	Oelwein,	Fayette.
Meredith, F. H.,	G.,	Ames,	Story.
Meyerhoff, D. H.,	G.,	E. Nodaway,	Adams.
Milburn, Warren P.,	M. E.,	Kansas City,	*Missouri.*
Minchen, John P.,	G.,	Carroll,	Carroll.
Morrison, Jennie,	L.,	Hedrick,	Keokuk.
Muhs, Fred R.,	C. E.,	Camanche,	Clinton.
Nettleton, Guy E.,	C. E.	Sheffield,	Franklin.
Nichols, Lydia A.,	L.,	Ames,	Story.
O'Neal, Melville E.,	G.,	Mason City,	Cerro Gordo.
Perley, C. Bert,	M. E.,	Monticello,	Jones.
Phelps, Fred S.,	M. E.,	Charles City,	Floyd.
Porter, Georgia,	L.,	Woodbine,	Harrison.
Porter, Kate M.,	L.,	Woodbine,	Harrison.
Quivey, L. Arthur,	G.,	New Hampton,	Chickasaw.
Raymond, Hud H.,	G.,	Hampton,	Franklin.
Rolfs, John A.,	G.,	LeClaire,	Scott.
Rutledge, Thomas T.,	G.,	Sharps,	Taylor.
Sanders, Edwin S.,	C. E.,	Iowa Falls,	Hardin.
Seydel, Charles F.,	G.,	Harper,	Keokuk.
Shepard, Edward A.	G.,	Villisca,	Montgomery.
Sloan, Robert J.,	G.,	Platteville,	Taylor.
Smith, Cora E.,	L.,	Marshalltown,	Marshall.
Spinney, Louis B.,	M. E.,	Massena,	Cass.
Stearns, Mattie L.,	L.,	S. Omaha,	*Nebraska.*
Stevens, Thomas W.,	G.,	Carroll,	Carroll.
Stewart, Fred C.,	G.,	Greenfield,	Adair.
Stokes, Arthur C.,	G.,	Rock Rapids,	Lyon.
Swanson, C. Frederick,	G.,	Madrid,	Boone.
Taylor, George M.,	G.,	Polk City,	Polk.

NAME.	COURSE.	POST OFFICE.	COUNTY.
Thornburg, Jennie,	L.,	Panora,	Guthrie.
Trotter, Walter F.,	M. E.,	Marshalltown,	Marshall.
Vail, Edward M.,	G.,	Marshaltown,	Marshall.
Van Houten, Ozro,	G.,	Lenox,	Taylor.
Vernon, John J.,	G.,	Bangor,	Marshall.
Walton, Charles A.,	C. E.,	Burlington,	Des Moines.
Weingartner, Edwin C.,	G.,	Davenport,	Scott.
Welsh, George H.,	M. E.,	Boone,	Boone.
White, Clark,	G.,	Corydon,	Wayne.
Williams Worthin H.,	M. E.,	Chester Center,	Poweshiek.
Wilson, Elmina,	L.,	Harper,	Keokuk.
Zmunt, Wincent,	G.,	Mitchell,	Mitchell.

—Freshmen 89.

VETERINARY.

Arney, Carney,	Manning,	Carroll.
Austin, William H.,	Milford,	Dickinson.
Heck, William A.,	Irwin,	Shelby.
Knight, Harry G.,	Sac City,	Sac.
Manchester, Edward L.,	Dunlap,	Harrison.
McClanahan, William A.,	Mt. Ayr,	Ringgold.
McCord, Elias S.,	Nevada,	Story.
Russell, Charles M.,	West Side,	Crawford.
Sorenson, Nels.,	St. Ansgar,	Mitchell.
Starkey, Grant F.,	Ames,	Story.
Whitbeck, Samuel S.,	New Hampton,	Chickasaw.
Wilson, Peter M.,	Traer,	Tama.

—Freshmen Veterinary Students 12.

—Total Freshmen 101.

SPECIAL STUDENTS.

NAME.	POST OFFICE.	COUNTY.
Andrews, Livonia,	Monroe,	Jasper.
Bigelow, Margarette M.,	Ames,	Story.
Bishop, Jay A.,	Lexington,	Washington.
Bower, Josie,	Glidden,	Carroll.
Bowman, Ralph H.,	Earlville,	Delaware.
Bradrick, Lydia,	Chariton,	Lucas.
Christie, Inez J.,	Vinton,	Benton.
Collins, Wilbur M.,	Knoxville,	Marion.
Dalbey, Nettie E.,	Ellsworth,	Hamilton.

NAME.	POST OFFICE.	COUNTY.
Dean, Nellie E.,	East Des Moines,	Polk.
Freeman, Alice M.,	Ellsworth,	Hamilton.
Fuller, Q. C.,	Swan Lake,	Emmet.
Gaston, Belle L.,	Marshalltown,	Marshall.
Gilbert, Ellis T.,	Council Bluffs,	Pottawattamie.
Hammer, Edward W.,	Des Moines,	Polk.
Hobart, Mark C.,	Cherokee,	Cherokee.
Hollenbeck, Nellie,	Sheldon,	O'Brien.
Johnson, John A.,	Munterville.	Wapello.
Jones, William B.,	Sharpsburgh,	Taylor.
Jongewaard, Cornelius A.	Orange City,	Sioux.
Kebler, Lyman F.,	Ann Harbor,	Michigan.
King, Charlotte M.,	Des Moines.	Polk.
Manlig, Anton,	State Center,	Marshall.
McCue, Frank, Jr.,	Ottumwa,	Wapello.
Mills, Frank W.,	Maxwell,	Story.
Norton, James C.,	Wilton Junction,	Muscatine.
Phillips, H. S.,	Oskaloosa,	Mahaska.
Richard, J. H.,	Jewell,	Hamilton.
Radnich, Helen.	Davis City,	Decatur.
Root, Lillian M.,	Cincinnati,	Appanoose.
Scott, Walter E.,	Eddyville,	Wapello.
Smith, Josephine,	Des Moines,	Polk.
Thompson, Lettie C.,	Agency,	Wapello.
Van Velsor, H. J. Cora,	Renwick,	Humboldt.
Whitehead, Frank E.,	Moingona,	Boone.

—Special Students 35.

HONOR LIST.

Commencement Speakers 1888, arranged in order of Scholarship.

W. E. Warwick, B. M. E.
L. C. Tilden, B. Sc.
Nathaniel Spencer, B. Sc.
F. L. Ainsworth, D. V. M.
J. E. Gyde, B. Sc.
A. E. Sheafe, B. Sc.
Miss Julia Wentch, B. L.
Sherman Yates, B. Sc.
Clarence Baker, B. C. E.
J. G. Abraham, B. S. A.

Junior Speakers, 1889, arranged in order of Scholarship.

Leo Thurlimann.
E. A Kreger.
Miss Minnie Roberts.
G. H. Schulte.
Miss Kate Stevens.
J. S. Chamberlain.
Miss May Hardy.
Miss Bertha Mann.
W. C. Dewell.
Spencer Haven.

SUMMARY.

Resident Graduates,	2
Seniors,	46
Juniors,	44
Sophomores,	56
Freshmen,	101
Special Students,	35
Total Enrollment,	284
Music Scholars not enrolled above,	13
Music Scholars total, including those enrolled above,	129
Total number of Ladies in College Classes,	82

HISTORICAL.

In 1858 the Legislature of Iowa passed an act to establish "A State Agricultural College and Model Farm," to be connected with the entire agricultural interests of the State; appointed a board of commissioners to buy a farm and erect a college building, and elected a board of trustees to select a faculty and organize a college. In 1859 a farm of six hundred and forty acres, situated near Ames, was purchased for the use of the college. This college and farm were entirely an agricultural institution.

In 1862 a bill was passed by Congress, entitled, "An act donating public lands to the several States and Territories, which may provide colleges for the benefit of Agriculture and the Mechanic Arts."

Section 1 of this bill says: "Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled, that there be granted to the several States for the purpose hereinafter mentioned, an amount of public land, to be apportioned to each State in quantity equal to thirty thousand acres for each Senator and Representative in Congress to which the States are respectively entitled by the apportionment under the census of 1860; provided that no mineral lands shall be selected or purchased under the provisions of this act."

Section 4 requires: "That all moneys derived from the sale of the lands aforesaid by the States to which the lands are apportioned, and from the sale of land scrip, hereinbefore provided for, shall be invested in stocks of the United States, or some other safe stock, yielding not less than five per centum on the par value of said stocks; and that the money so invested shall constitute a perpetual fund, the capital of which shall remain forever undiminished (except as may be provided for in section fifth of this act), and the interest of which shall inviolably be appropriated by each State which may take and claim the benefit of this act, to the endowment, support and maintenance of at least one college, where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the Legislatures of the States may provide, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

Section 5 says: "And be it further enacted, that the grant of land and land scrip hereby authorized shall be made on the following conditions, to which, as well as to the provisions hereinbefore contained, the previous assent of the several States shall be signified by Legislative acts: First, if any portion of the fund invested as provided by the foregoing section, or any portion

of the interest thereon, shall, by any action or contingency, be diminished or lost, it shall be replaced by the State to which it belongs, so that the capital of the fund shall remain forever undiminished; and the annual interest shall be regularly applied without diminution to the purposes mentioned in the fourth section of this act, except that a sum not exceeding ten per centum upon the amount received by any State under the provisions of this act, may be expended for the purchase of lands for sites or experimental farms, wherever authorized by the respective Legislatures of said States. Second, no portion of said fund nor the interest thereon, shall be applied, directly or indirectly, under any pretense whatever, to the purchase, erection, preservation, or repair of any building or buildings."

In 1872 the General Assembly accepted the grant upon the conditions and under the restrictions contained in the act of Congress, and by so doing entered into a contract with the General Government to erect and keep in repair all buildings necessary for the use of the College. By this action of the General Assembly the College was changed from a purely agricultural institution into a College of Agriculture and Mechanic Arts, with the broad and liberal course of study outlined in the following paragraph.

In 1882 the General Assembly passed an act defining the course of study to be pursued, as follows: Section 1. That section 1621 of the Code is hereby repealed, and the following is enacted in lieu thereof: Section 2621. That there shall be adopted and taught at the State Agricultural College a broad, liberal and practical course of study, in which the leading branches of learning shall relate to agriculture and the mechanic arts, and which shall also embrace such other branches of learning as will most practically and liberally educate the agricultural and industrial classes in the several pursuits and professions of life, including military tactics. Section 2. That all acts and parts of acts inconsistent with this act are hereby repealed.

The income of the College (including the Congressional appropriations of $15,000 per year for the Experimental Station) averages about $60,000 per year, about $30,000 of which is expended for salaries of professors, instructors and foremen, and $15,000 to $20,000 for agricultural experimentation. The remainder is required for the necessary running expenses of the various departments and minor expenditures of the College, and for the purchase of chemical, physical and other apparatus. New buildings are erected and repairs are made from special Legislative appropriations for the purpose.

The College was formally opened on the 17th of March, 1869. In the spring of 1888, the State Agricultural Experiment Station was established as a department of the College, under the law of Congress known as the Hatch Experiment Station Act, passed in 1887. This law provides for the establishment of such a station in each State that accepts the conditions, and contemplates an appropriation by Congress each year of $15,000 to each Station so established. The appropriations have now been made for two years, and there is no doubt of their continuance.

LOCATION.

The College occupies a delightful and healthful location, on high, rolling land, a mile and a half west of the town of Ames, which is at the junction or crossing of two lines of the Chicago & Northwestern Railway, in the center county (Story) of the State, and thirty-seven miles north of the city of Des Moines. The railroad facilities for reaching Ames from every part of the State are excellent. Regular conveyances for passengers and baggage run between the railway station and the College three times each day, except Sundays.

BUILDINGS, GROUNDS AND EQUIPMENTS.

Twelve commodious buildings have been erected by the State for the exclusive use of the various departments of the College, besides the dwelling-houses and the buildings for farm stock, machinery and work.

The main College Building is five stories high including the basement and is 158 feet long by 112 feet through the wings. In the basement (which is almost wholly above ground and is thoroughly lighted and well ventilated) are the dining-room, kitchen, room for help, and one Society room. On the first floor, proper, are the chapel, the library, reception rooms, recitation rooms, music rooms and the offices of some of the teachers and the steward. On the second floor are several recitation rooms and rooms for students and teachers. On the third and fourth floors are students' rooms and the zoological and geological museums. About two hundred students can be accommodated with rooms in this building. All the rooms are heated by steam and lighted by electricity. Pure spring water is supplied in all the stories of the building. The water closets are brick towers separated from the main building by a space of twelve feet each, connected only by open lattice bridges with the different stories. With the best modern system of plumbing, including automatic flushing, the sanitary condition of the dormitories is pronounced perfect.

There are also two Boarding Cottages, brick buildings, affording rooms for eighty students: with dining-room, kitchen and store rooms. The cottages are supplied with pure spring water and lighted by electricity.

The Chemical and Physical Hall is a large three-story brick building, 70x44 feet, with a wing 61x31 feet. The first floor contains the chemical laboratories: the second the physical apparatus, and lecture room, while two draughting rooms occupy the third floor. In the basement are the heating apparatus and a large recitation room. This building is warmed by steam and supplied with water and gas, and with outfits for more than one hundred students to conduct individual experiments and investigations in chemistry and physics.

North Hall is a two-story brick building, 40x70 feet. On the first floor are

the rooms for the departments of agriculture and zoology, and on the second floor are the rooms of the botanical department, with outfits for individual laboratory work similar to that done in chemistry and physics.

Horticultural Hall is a frame building, containing on the first floor a large lecture room and a tool room. On the second floor is the horticultural museum. The cellar has two large rooms, one for the storage of garden products, the other for the use of the nursery propagating department. A grafting room and propagating house are attached, heated by hot water.

South Hall is a two-story brick building, which has been refitted for the Department of Domestic Economy, and contains the accessories of a model home as well as apparatus for instruction.

The Office is a substantial two-story brick building, for the use of the Board of Trustees, the President, Secretary and Treasurer.

Six dwelling-houses upon the College grounds are occupied by Professors' families, and several others by foremen and employes.

The College Creamery, a frame building, is conveniently situated near the farm house. The farm barns are adjacent—one of brick, for the horses, and one large farm barn, in the basement of which is a stable for one hundred head of cattle. There is also another stable near by for about fifty head. Also sheep and swine houses, buildings for machinery, etc.

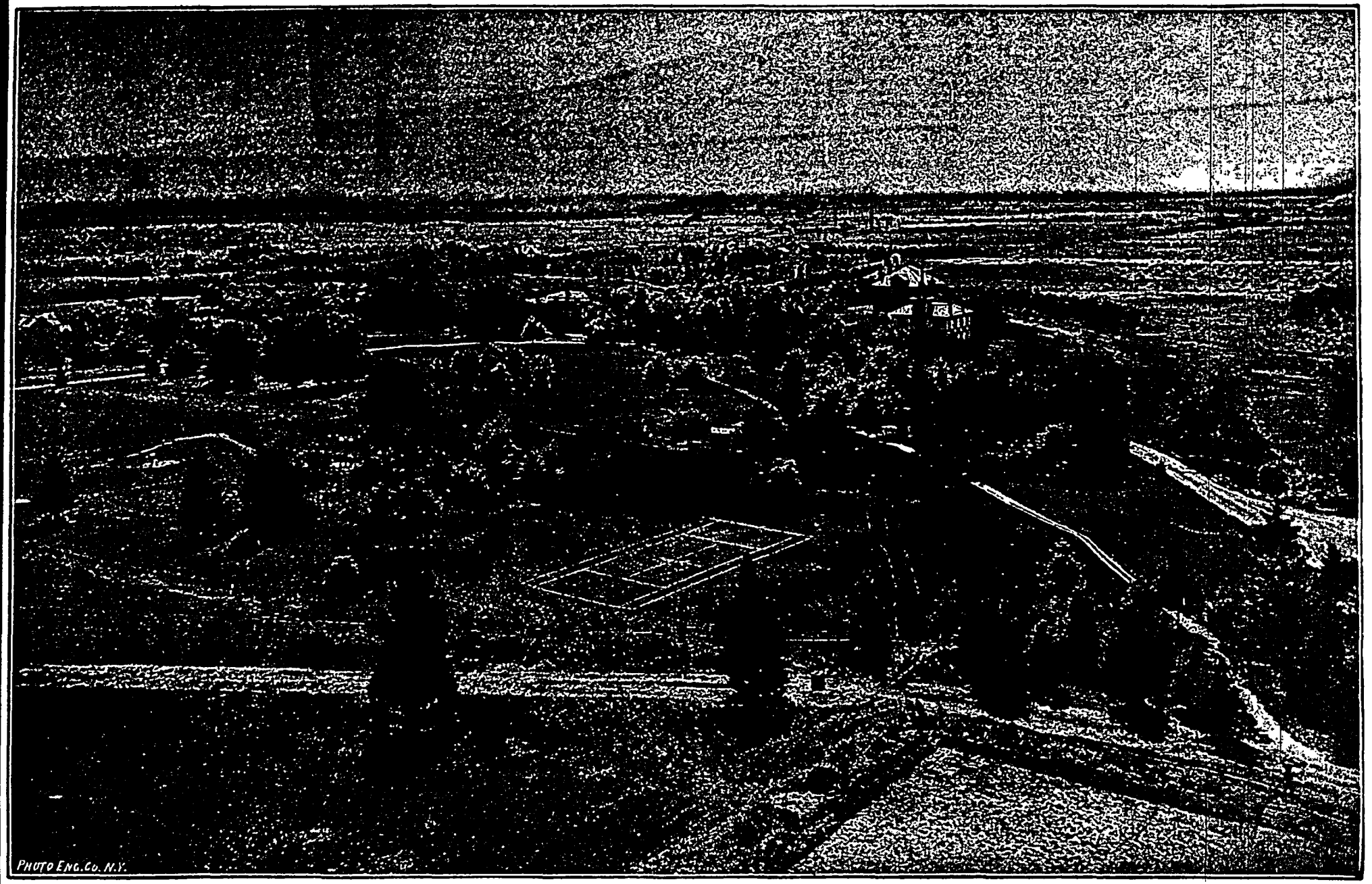
The Veterinary Buildings, costing ten thousand dollars, comprise a building for the offices and class-rooms of Professors in this department, and a hospital with all the modern appliances for the treatment of diseased animals. The Department of Veterinary Science is believed to be the best equipped for the work of any in the Western States.

Engineering Hall is a large and substantial brick building on the West Side of the Campus. On the third floor devoted to the Department of Civil Engineering are a large draughting room, instrument and recitation rooms and the private office of the Professor in charge.

On the second floor is a pleasant reading room, provided with leading books and periodicals on civil and mechanical engineering topics, freely used by the students of both departments.

The rest of the building, first and second floors and basement, are used by the Department of Mechanical Engineering. On the second floor is a large well lighted room for mechanical and free hand drawing, recitation rooms and private office of the Professor in charge. On the first floor are the machine shops, well equipped with power and hand machines and tools; and the office of foreman and shop instructor. The basement is fitted up for work in moulding and casting.

A large frame building adjacent, contains the carpenter and pattern shops with power and hand tools and machines, and outfits of tools for individual work. The boiler and engines used for running the shops and electric lights, are equipped for making power tests, and boiler and pump tests, for the instruction and training of the engineering students.



Bird's Eye View South-East—From Tower of Main Building.

In 1888 the Experiment Station building was erected and equipped at a cost of about nine thousand dollars, including library apparatus and material. It contains offices and laboratories for the Director, Chemist, Botanist and Entomologist, and library and propagating rooms.

THE COLLEGE GROUNDS.

The College Domain includes about 900 acres. Of this about 120 acres are set apart for College Grounds, and 120 for the Experiment Station. The former occupy the high land of the southwest part of the farm and include the campus, shrubbery plantations, young forestry plantations, the flower borders and gardens with the beginnings of a botanical garden, and the surroundings of the professors' dwellings. Gravel drives and walks lead to all parts of the grounds and to the various buildings, and the true principles of landscape gardening have been so faithfully observed in the grading and in the location of buildings and drives, as to make of the entire campus a large and beautiful park. The view of the surrounding country from the upper stories and towers of the Main Building is one of wide extent and great beauty.

DIRECTIONS TO CANDIDATES AND STUDENTS.

REQUIREMENTS FOR ADMISSION.

Students seeking admission to the College must be sixteen years of age.

Candidates for membership in the Freshman class, must bring testimonials of good moral character and give evidence of a thorough knowledge of Orthography, English Grammar, Arithmetic, United States History, Human Physiology (and except in Veterinary course) Algebra through simple equations.

Entrance Examinations will be held at the College on the first and second days of each term. The first-class teachers' certificate of any county Superintendent will be received in lieu of an examination for Freshman standing, in the studies covered thereby.

Certificates from the following schools will also be accepted provided; (1) that they be based on examinations conducted within one year of presentation, and mark not less than 85 on a scale of 100; (2) that they be signed by the Principal or Superintendent, and certify to the required amount and grade of work in each study; (3) that they be made out on blanks furnished on application to the President of the College. The right is however reserved of examining any candidate in any study if occasion seems to require.

Other schools of equal grade will be added to this list on application, with statement of course of study. The entire list will be revised each year.

LIST OF HIGH SCHOOLS.

Adel, Albia, Algona, Ames, Anamosa, Atlantic, Belle Plaine, Boone, Brooklyn, Burlington, Carroll, Cedar Falls, Cedar Rapids, Chariton, Charles City, Cherokee, Clarinda, Clinton, Columbus City, Corydon, Council Bluffs, Cresco, Creston, Davenport, Dennison, Des Moines, DeWitt, Dunlap, Eldora, Emmetsburg, Estherville, Fairfield, Forest City, Fort Dodge, Guthrie Center, Hamburg, Hampton, Harlan, Ida Grove, Independence, Iowa City, Iowa Falls, Jefferson, Keokuk, LaPorte, LeMars, Leon, Logan, Maquoketa, Manchester, Marengo, Marion, Marshalltown, Mason City, Monroe, Monticello, Missouri, Valley, Mt. Pleasant, Muscatine, Nashua, Nevada, Newton, Odebolt, Onawa, Orange City, Osage, Osceola, Oskaloosa, Ottumwa, Red Oak, Rock Rapids, Sac City, Sioux City, Storm Lake, Tama City, Tipton, Traer, Vinton, Washington, Waterloo, Webster City, West Union, Wilton, Winterset.

LIST OF ACADAMIES AND OTHER SCHOOLS.

Albion Seminary, Algona Academy, Burlington Collegiate Institute, Decorah Institute, Denmark Academy, Epworth Seminary, Howe's Academy, Iowa City Academy, Northern Iowa Academy, Springdale Seminary, and Washington Academy.

HOW TO ENTER THE COLLEGE.

Persons who desire to enter the college as new students should comply with the following directions:

1. Write to the President for a college catalogue, and study carefully and comply with the "Requirements for Admission" on page 26, immediately preceding this. Then write to the President about three weeks before the beginning of the term, asking for a card of inquiry and information.

2. On receiving the card of inquiry, write an answer opposite each question and mail the card to the President. If the answers you give accord with the "Requirements for Admission," a card of introduction will be sent you, which simply entitles you to admission on passing the examinations or giving the required proof of proficiency.

3. When you arrive, at the opening of the term, present this card of introduction to the Steward, in his office at the rear of the chapel in the main building; select your room, pay the rent, make your deposit, (see page 28), and, without loss of time, show your receipt therefor to the President at his office, south of the main building. If you have not the proper certificate of proficiency in the studies required, you will there secure a card for examination.

4. Attend punctually every examination at the time and place indicated on that card. When all the examinations are completed, and your standings therein are marked on the card, return it to the President at his office. If you have passed the studies required with a standing of 3 or over, (4 being perfect), you will then sign the Student's Record Book and Contract, and secure a card of classification, which certifies your admission to the College and assigns you to your proper classes.

5. Present the card of classification to each of the teachers having charge of the classes to which you are assigned, and attend thereafter every recitation of the term.

THE CLASSIFICATION OF STUDENTS.

Students who fail to secure the required pass mark in any study must make up that study before it is taken by the next college class, or classify *back* with that class in that study. If their mark is 2.75 or below on a scale of 4.00

they will not be permitted to make up the work by themselves, but must take it over again with the next class.

N. B.—To enable students to make up back studies, such examinations as may be necessary will be held during the first week of each term. At the beginning of the year in February no student can classify for promotion with his class until he has passed a satisfactory examination on all studies but one of the preceding year, and that study must be passed by the end of the first week *of the next term.*

STUDENTS' EXPENSES, ETC.

No charge is made for tuition to Iowa students. To those who come from outside the State $30.00 tuition per year will be charged, unless remitted to worthy students by special vote of the Trustees, on recommendation of the Faculty.

For board, heating, lighting, cleaning and care of the college buildings, students pay less than the items actually cost the Institution. Injury to college property, of whatever sort, is charged to the author, when known; otherwise to the section, or the entire body of students, as may seem most just in the given case.

Students who board in any of the college buildings **furnish their own bedding, and all furniture for their rooms,** excepting bedsteads, washstands, tables and wardrobes. They are earnestly advised to bring from home carpets, etc., **to make their rooms comfortable and cheerful.** Male students in the lower classes, not physically disabled, are required by law to take the military drill, and purchase uniforms therefor. "Physical disability" must be certified by our Surgeon, Dr. Fairchild, on physical examination.

The current expenses of students during the year 1888, were about as follows:

In the Main College Building:—	
Board per week	$2 25
Lighting and heating, per week	40
Incidentals per week	21
Room rent, per term	3 00 to 4 00
Hospital fees per term*	75
In the Boarding Halls:—	
Board per week	2 00
Fuel and lighting, per week	25
Janitor's fee, per term	3 00
Room rent per term	2 00 to 3 00
Hospital fees, per term*	75
For day students:—	
Janitor's fee, per term of seventeen weeks	4 00

*NOTE—A commodious and secluded hospital building is provided, and this hospital fee of 75 cents insures to each student free nursing and medical attendance in case of accident or sickness. This gives the means also of checking and controlling measles, mumps and other contagious diseases should they appear. The hospital has proved to be a great blessing to the students, and the insurance is placed at otual cost.

As security for the payment of all bills against him, each student, at the opening of the term, is required to make deposits with the Steward as follows:

On board account in Main Building (for those who board there)	$20 00
On board account in boarding halls (for those who board there)	15 00
On room and furniture account	5 00
On General breakage and damage account	1 00

These deposits will be returned on final settlement at the close of the term.

All bills for each month must, without fail, be settled at the Steward's office on the second Saturday of the month following.

The dining room will be opened on the evening preceding the respective days on which the spring and fall terms commence. *No allowance on board bills is made for absences.* Students and others who bring guests to their tables are required to purchase meal tickets. All students are required to board and room in the Main Building or in one of the Cottages, except when permission to board elsewhere has been for good reason granted by vote of the Faculty.

Text books and stationery may be purchased at the College Book-store at about twenty-five per cent below the average retail prices, that is *actual cost to the College.*

MANUAL LABOR—SHOP, LABORATORY AND FIELD PRACTICE.

The following regulations in regard to manual labor have been adopted by the Board of Trustees:

1. The manual labor of students is divided into two kinds, viz: uninstructive labor, which shall be paid for in money; and instructive labor, which shall be compensated by the instruction given and the skill acquired.

2. Uninstructive labor shall comprise all the operations in the work-shop, the garden, upon the farm and elsewhere, in which the work done accrues to the benefit of the college and not to that of the student. Instructive labor shall embrace all those operations in the work-shop, museum, laboratories, experimental kitchen, upon the farm and in the garden, in which the sole purpose is the acquisition of knowledge and skill.

3. Students shall engage in instructive labor in the presence and under the instruction of the professor in charge, according to the statement made in each of the courses of study.

4. The compensated labor furnished by the Department of Science and Agriculture, of Veterinary Science, and of Engineering, is given by each to its own students, and is eagerly sought.

5. The "details" of compensated labor supplied by the needs of the various departments are given to the most faithful and meritorious students in each department.

6. Uninstructive labor is paid for according to its value to the College, but no student should expect to pay the main part of his expenses by labor

while here. The College cannot undertake to furnish the work, and even if it could, the student's time is *chiefly needed for study.* Still, many worthy and industrious students pay a considerable part of their expenses by labor, some $3000.00 being paid out by the College thus each year.

GOVERNMENT.

The crowded buildings of the College and the nature of the exercises, complicated as they are by laboratory work, shop practice and manual labor, make order, punctuality and systematic effort indispensable. This institution, therefore, offers no inducements to the idle or self-indulgent. All who are too independent to submit to needful authority, or too reckless to accept wholesome restraint, are advised not to come here. The discipline of the College is confined mainly to sending away promptly those who prove on fair trial and faithful admonition to be of the above class, and to be doing more harm to the institution than can be compensated by any benefit they may themselves receive. Those who share here the benefits of the State and National endowments are expected to show themselves worthy of them.

The use of tobacco by students on the College premises is fordidden. The presence of ladies and of members of the Faculty in the various rooms and halls renders this imperative, to say nothing of other considerations. Those who are already so addicted to the use of tobacco that they cannot cheerfully submit to this regulation are advised to go elsewhere. Of course the use of intoxicating beverages and of profane and obscene language is also forbidden.

PUBLIC WORSHIP.

Officers and students gather daily in the chapel for public worship, except on Wednesday, when the chapel hour is needed for military drill and dress parade, and on Saturday, when there are no college exercises. On Sunday morning at 10:45 a discourse is given in the chapel by the President, one of the Professors, or a Clergyman invited for the occasion. The object of these services is to emphasize and enforce the principles of morality and of the Christian religion; but in a State Institution like this it would be manifestly improper to teach or to cotnrovert the tenets of sectarianism.

The Faculty require on Sunday such conduct and decorum in and about the College buildings as befit the observance of the Sabbath.

COURSES OF STUDY.

Five courses of study are offered, as follows:

(1.) *The Course in Science and Agriculture,* of four years, aims to give a liberal culture in the sciences and other branches of learning which

underlie agriculture and the other great industries of the country. The degree of Bachelor of Science (B. Sc.) is conferred upon those who complete this course.

(2.) *The Course for Ladies*, of four years, meets a growing demand for the higher education of women. It provides an opportunity for a more thorough study of literature along with a somewhat lighter course in the natural sciences and mathematics. It leads to the degree of Bachelor of Letters (B. L.)

(3.) *The Course in Mechanical Engineering*, of four years, leads to the degree of Bachelor of Mechanical Engineering (B. M. E.)

(4.) *The Course in Civil Engineering*, of four years, leads to the degree of Bachelor of Civil Engineering (B. C. E.)

(5.) *The Course in Veterinary Science*, of three years, leads to the degree of Doctor of Veterinary Medicine (D. V. M.)

The candidate for graduation in any of the courses must have met all requirements therefor. In the technical courses he must present a final thesis. In the course in Science and Agriculture and in the Ladies' course, orations are required in 1889. Thereafter theses will be required in these courses also:

GRADUATING THESIS.

The subjects of Theses shall be selected under direction of the Professor in whose department they are written, and submitted to the thesis Committee, with signed approval of the Professor, on or before the First Monday in April.

It is expected that each thesis shall represent an amount of work equivalent to at least one exercise per week through the senior year. (It is often desirable that observations and laboratory work should extend over even a greater length of time, and students are encouraged to determine upon their subjects for thesis work as early in the course as practicable.)

That it shall show the results of the student's personal study or investigation, and be throughout original in matter and treatment so far as the nature of the subject will permit.

That it shall be prepared under the supervision of the Professor in charge, the student making frequent reports of progress and having an outline of the matter ready for approval by the first week of the last term.

The thesis ready for examination and marking with its specific title and the written approval of the Professor in charge shall be presented to the Thesis Committee at a date fixed by the Committee during the four weeks preceding Commencement Day.

A type-written copy prepared according to rules held by the librarian must be deposited in the library before the student can be recommended for graduation.

The graduation fee in each course is five dollars.

THE COURSE IN SCIENCE AND AGRICULTURE.

FRESHMAN YEAR.

FIRST TERM.	SECOND TERM.
Algebra, Advanced—5*	Botany, Elementary—2.
Drawing—2.	Drawing—2.
Drill, Military—2.	Drill, Military—2.
Elocution—1.	Entomology, Economic—2.
English: Language and Composition—4.	Geometry—5.
History—5; or Latin—5.	Horticulture—2.
Lectures Field, on Agriculture, with practice—5 hours.	Field Lecture—1.
Stock Breeding—2.	Rhetoric, Applied—3; or Latin—4.

SOPHOMORE YEAR.

FIRST TERM.	SECOND TERM.
Agriculture, Practical—2.	Botany, Cryptogamic—3.
Botany, Systematic—3.	Laboratory Practice—1.
Laboratory Practice—1§.	Chemistry, General—2.
Chemistry, General—3.	Laboratory Practice—2.
Laboratory Practice—2.	Drill, Military—2.
Drill, Military—2.	Geometry, Analytical—5+
Physics, Mechanics—2.	Horticulture—2.
Surveying, Land—5, eight weeks.	Physics, Heat—3.
Practice, Field—2.	Zoology—3.
Trigonometry, Plane—5, nine weeks.	Laboratory Practice—1.

JUNIOR YEAR.‡

FIRST TERM.	SECOND TERM.
Botany, Bacteriology—1.	Botany, Applied—1.
Laboratory Practice—1.	Laboratory Practice—1.
Calculus—5.	Chemistry, Organic—3.
Chemistry, Quantitative—2.	Laboratory Practice—1.
Laboratory Practice—3.	Dairying—2.
Elocution—2	Economy, Political—3 or 5.
German—5.	Entomology—5.
Horticulture—2.	German—5.
Law, Commercial—2.	Horticulture—3.
Literature, English—3.	Literature, English—5 or 3.
Physics: Magnetism and Electricity—3.	Physics: Light and Sound—3.
Zoology—3.	Laboratory Practice—1.
Laboratory Practice—2.	Physiology—4.

SENIOR YEAR.‡

FIRST TERM.	SECOND TERM.
Agriculture—4.	Agriculture—3.
Anatomy of Domestic Animals—5.	Civilization, History of—5.
Astronomy—5.	Climatology—1.
Chemistry, Agricultural Lab. Prac.—3.	Drainage—1.
Geology and Mineralogy—5.	Ethics and Civics—4
German—5.	Insects, Injurious—1.
Psychology (including human brain three weeks)—5.	Medicine and Surgery, Veterinary—5.
Seeds and Grasses—2.	Pathology, Vegetable—2.
Stock-feeding—1.	Thesis, Required—1.
Thesis, Required—1.	

* These figures indicate the number of recitations per week.
§ In all Laboratory work three hours count as one recitation.
+ Students who take Analytical Geometry may omit Botany.
‡ In the Junior and Senior years the student is permitted to select from the list for each term a number of studies aggregating (in addition to Elocution if chosen), not less than fifteen nor more than eighteen exercises per week.

THE COURSE FOR LADIES.

FRESHMAN YEAR.

FIRST TERM.	SECOND TERM.
Algebra, Advanced—5. Drawing—2. Elocution—1. English: Language and Composition—4. French—5, or Latin—5.	Botany, Elementary—2. Drawing—2. Economy, Domestic—1. Laboratory Practice—1. Elocution—2. French—5, or Latin—5. Geometry—5. Rhetoric, Applied—3. Zoology, Elementary—2 (optional).

SOPHOMORE YEAR.

FIRST TERM.	SECOND TERM.
Botany, Systematic—2. Economy, Domestic—1. Laboratory Practice—1. French—4, or Latin—4. History, Ancient—2. * And choice of Chemistry—3, and Laboratory Practice—2, or any two of the following sciences: Physics—2, Trigonometry—5, nine weeks, Additional Botany—2.	French—4, or Latin—4. History, Modern—2. *And a choice of two of the following sciences: Botany—4, Chemistry—4, Analytical Geometry—5, Physics—3, Zoology—4.

JUNIOR YEAR.*

FIRST TERM.	SECOND TERM.
Botany, Bacteriology—1. Laboratory Practice—1. Calculus—5. Chemistry, Quantitative—2. Laboratory Practice—3. Elocution—2. German—5. Horticulture—2. Law, Commercial—2. Literature, English—3. Physics, Magnetism and Electricity—3. Zoology—3. Laboratory Practice—2.	Botany, Applied—1. Laboratory Practice—1. Chemistry, Organic—3. Laboratory Practice—1. Dairying—2. Economy, Political—3 or 5. Entomology—5. German—5. Horticulture—3. Literature, English—5. Physics, Light and Sound—3. Laboratory Practice—1.

SENIOR YEAR.*

FIRST TERM.	SECOND TERM.
Astronomy—5 Chemistry, Soph. and Junior—5. Geology and Mineralogy—5. German—5. Psychology (including Human Brain)—5, three weeks. Thesis (required)—1.	Civilization, History of—5. Domestic Economy—1. Laboratory Practice—1. Ethics and Civics—4. Pathology, Vegetable—2. Physiology—4. Thesis (required)—1.

*In the Junior and Senior years the student is permitted to select from the list for each term a number of studies aggregating (in addition to Elocution if chosen), not less than fifteen nor more than eighteen exercises per week.

THE COURSE IN MECHANICAL ENGINEERING.

FRESHMAN YEAR.

FIRST TERM.	SECOND TERM.
Algebra, Advanced—5. Drawing, Free hand—2. Drawing, Mechanical—2. Drill, Military—2. Elocution—1. English: Language and Composition—4. French—5. Shop Practice 8 hours per week.	Drawing, Free hand—2. Drawing, Mechanical—2. Drill, Military—2. Elocution—2. French—5. Geometry—5. Rhetoric, Applied—3. Shop Practice 8 hours per week.

SOPHOMORE YEAR.

FIRST TERM.	SECOND TERM.
Chemistry, General—3. Laboratory Practice—2. Drill, Military—2. Drawing, Mechanical—1. Geometry, Descriptive—3. Physics: Mechanics—2. Shop Work 8 hours per week. Trigonometry and Surveying—5. Field Practice—1.	Chemistry, General—3. Laboratory Practice—2. Drawing, Mechanical—2. Drill, Military—2 Geometry, Analytical—5. Physics: Heat—3. Shop Work 8 hours per week. Trigonometry, Spherical—1.

JUNIOR YEAR.

FIRST TERM.	SECOND TERM.
Calculus—5. Contracts, Laws of—2, 5 weeks. Drawing, Mechanical—2. Mechanics, Analytical—4, 12 weeks. Physics—3. Shop Work 8 hours per week. Steam Engine—4, 5 weeks. Steam Engine—2, 12 weeks. Statics, Graphical—1.	Drawing, Mechanical—2. Economy, Political—3 Engineering Constructions—1. Engineering, Mechanics of—4. Physics, Special—3. Laboratory Practice—2. Machine Design—1. Shop Work 9 hours per week.

SENIOR YEAR.

FIRST TERM.	SECOND TERM.
Drawing, Mechanical—2. Heat-Engines and Boilers—2. Kinematics—2. Literature, English—3. Machinery, Mechanics of—4. Thermodynamics—4. Shop Practice 9 hours per week. Thesis begun.	Designing—2. Engineering, Materials of—1. Graphics—1. Hydraulics—2. Machinery, Mechanics of—4. Mechanical Laboratory 9 hours per week Physics, Laboratory Practice—2. Thesis—5.

THE COURSE IN CIVIL ENGINEERING.

FRESHMAN YEAR.

FIRST TERM.	SECOND TERM.
Algebra, Advanced—5.	Botany, Elementary—2.
Drawing, Free-hand 4 hours per week.	Drawing, Free-hand 4 hours per wk.
Drill, Military—2.	Drill, Military—2.
Elocution—1.	Elocution—2.
English, Language and Composition—4.	French—5.
French—5.	Geometry—5.
History—5.	Rhetoric, Applied—3.

SOPHOMORE YEAR.

FIRST TERM.	SECOND TERM.
Botany, Systematic—2.	Drill, Military—2.
Chemistry, General—3.	Field Practice—1.
Laboratory Practice—2.	Geometry, Analytical—5.
Drill, Military—2.	Physics: Heat—3.
Field Practice—1.	Surveying, Railway—5.
Geometry, Descriptive—5.	
Physics: Mechanics—2.	
Surveying and Trigonometry—5.	

JUNIOR YEAR.

FIRST TERM.	SECOND TERM.
Calculus—5.	Economy, Political—3.
Mechanics: Analytical—4, 12 weeks.	Electricity, Special—3.
Physics: Magnetism and Electricity—3.	Laboratory Practice—2.
Stereotomy and Drawing—4.	Engineering, Sanitary—3.
	Materials, Resistance of—4.
	Surveying, Railway—3.

SENIOR YEAR.

FIRST TERM.	SECOND TERM.
Designing—3.	Civilization, History of—3.
Geology—5.	Designing—5.
Psychology—5.	Lectures—3.
Structures, Bridge and Roof—5.	Structures, Bridge and Roof—5.
Wood, Structure of—1.	Walls, Retaining—2.
Thesis begun.	Thesis, Preparation of—3.

THE COURSE IN VETERINARY SCIENCE.

FRESHMAN YEAR.

FIRST TERM.	SECOND TERM.
Anatomy of Domestic Animals—5.	Anatomy of Domestic Animals—2.
Dissection and Clinic, 4 aft'n's per wk	Botany, Elementary—2.
Drill, Military—2.	Dissection and Clinic, 3 aft'n's per wk.
English: Language and Composition—4.	Drill, Military—2.
Histology—2.	Medicine, Ve erinary—5.
Laboratory Prac tice—1.	Physiology—4.
	Zoology—2.

JUNIOR YEAR.

FIRST TERM.	SECOND TERM.
Botany, Pharmaceutical—2.	Anatomy of Domestic Animals—2.
Chemistry, General—3.	Chemistry—3.
Laboratory Practice—2.	Laboratory Practice—3
Dissection and Clinic, 2 aft'n's per wk.	Clinic, 1 afternoon per week.
Drill, Military—2.	Drill, Military—2.
Materia, Medica—4.	Medicine, Veterinary—3.
Physiology—3.	Ophthalmology—1.
Zoology—2.	Pathology, General—2.
Laboratory Practice—1.	Laboratory Practice—1.
	Parasites, Animal—2.

SENIOR YEAR.

FIRST TERM.	SECOND TERM.
Botany, Bacteriology—1.	Anatomy of Domestic Animals—5.
Laboratory Practice—1.	Clinics, five afternoons per week.
Chemistry—2.	Medicine, Veterinary: Principles and
Laboratory Practice—3 (1st 5 wks.)	Practice—3.
Clinics—5. (after)	Obstetrics—1.
Pathology, Comparative—2. (5th week.)	Ophthamology—1.
Therapeutics—2.	Surgery, Principles of Operation—1.
Surgery, Veterinary: Principles and	Therapeutics—2.
Practice—3.	Therapeutics, Surgical—1.
Thesis begun.	Thesis fin'd 4 w'ks before close term.

REMARKS ON THE COURSE IN SCIENCE AND AGRICULTURE.

In the Freshmen and Sopohmore years this course is clearly defined, and but few elective studies are offered.

In the Junior and Senior years, however, the student is permitted to select for each term a number of studies aggregating not less than fifteen nor more than eighteen exercises per week. The student may thus continue as fully as he desires through the last two years the practical agricultural and horticultural studies that are pursued the first two years as required studies. It will be observed that all studies in this course, indeed in all the courses, bear directly upon industrial life. No study can be selected unless the studies *necessarily antecedent to it* have been passed. Selections must be made before the expiration of the second day of the term, and once made cannot be changed.

Any member of the Junior or Senior class who is a candidate for the degree of B. Sc., and who desires to pursue work in any general branch of study to a greater extent than is outlined in this course, can do so if his written application for the same receives the endorsement of the professor in charge of the given study or department, and of the President, and provided it will not cause any conflict in the hours of recitation. The amount of time given to such study as decided by the professor in charge will be counted as a part of the whole amount of work required. In selecting such additional work the other studies making up the required number of exercises shall embrace the subjects most closely related to it, and this special study allowed shall not exceed one-third of the term's work.

MATHEMATICS.

ALGEBRA.—In algebra there are two divisions. The first of these is composed of students who show by their entrance examinations thoroughness in arithmetic and a ready familiarity with the principles of algebra through equations of the first degree; the second includes all students who obtain a high standing in arithmetic, and pass the required examination in algebra, but who show in this latter study a want of thoroughness. Particular attention is given in this study to the explanation of the cardinal principles, and the drill in the solution of problems and questions is conducted with reference to fixing these principles in the mind of the student.

GEOMETRY.—All students who complete algebra and secure a standing of three (four being perfect) in either of the divisions in algebra are permitted to enter the class in geometry. This class is divided into two divisions, corresponding with those in algebra. The student is early taught the full meaning of a geometrical demonstration. He is warned against learning any proposition by rote; and in order that he may not fall into this error, he is, at the end of the first book, assigned original theorems, which he is required to demonstrate. He is expected not only to understand thoroughly each proposition, but to be able so to arrange and present the points of proof as to form a complete and perfect demonstration.

E. W. STANTON, *Professor*, and A. E. KIRKPATRICK, *Instructor*.

PLANE TRIGONOMETRY.—Instruction is given in this branch during the first nine weeks of the Sophomore year. The class is thoroughly drilled in the nature and use of trigonometrical functions.

SURVEYING occupies the remaining eight weeks of the first term of the Sophomore year. Thorough drill is given in the use of surveyor's instruments, and in the measurement of lines and angles and the computation of areas.

C. F. MOUNT, *Professor*.

ANALYTICAL GEOMETRY.—This study is pursued by the Sophomore class during its second term. The course of instruction embraces determinate and indeterminate geometry, including a full examination of the conic sections. The underlying principles are brought prominently forward and discussed. The student is required carefully to analyze each article, and solve the problem connected therewith. To secure thoroughness frequent reviews are given.

E. W. STANTON, *Professor*.

CALCULUS.—Instruction in calculus is given during the spring term of the Junior year. To enter this class it is necessary that the student should have passed the lower mathematical studies of the course. In no case can this study be pursued successfully without previous drill in analytical geometry. The abstruse principles of this method of mathematical investigation are explained upon the theory of *rates*, rather than upon the theory of *infinitesimals*. Instruction is given by daily recitations and lectures, with a review of the week's work each Friday. Twelve weeks are devoted to differential, and the remainder of the term to integral calculus.

E. W. STANTON, *Professor*.

PHYSICS.

Reference to the various courses of study outlines the work in Physics. The order in which the study is pursued is as there given. The subject is taught by lectures, text-books and recitations thereon. The work offered in the course in Science and Agriculture is fairly equivalent to that found in Des-

chanel's Natural Philosophy, or Daniell's Principles of Physics. Experimental demonstrations are given for the fundamental facts of the Science, illustrating the various laws; and the applications of these laws in the various industries and arts are indicated. The object of lecture room experiment is to illustrate scientific doctrine. What the student wants is not a large number of experimental facts, however well classified; but a few well selected fundamental facts and the scientific doctrine which those facts represent. The method of instruction, in this department, is in harmony with the above statement. By this plan it is hoped that the *thoughtful* student will discriminate clearly between principle and illustration, and lay them away in memory accordingly.

The first term Sophomore year is given to mechanics. Particular attention is given to the laws of motion, and to the doctrine of energy and the application of this doctrine in this branch of the subject. Text-book, Deschanel's Part I. Heat is studied the second term Sophomore year. Heat is energy; and it is from this standpoint that the whole subject is studied. More attention is given to the quantitative relations of the various phenonema studied than to gathering statistics on the subject. Text-book, Maxwell's Theory of Heat. The first term Junior year the subject of electricity and magnetism is studied. The doctrine of Potential is made the co-ordinating principle in this ever widening field of Physics. Particular attention is given to the relation of electricity to magnetism, as manifested in the fact of induction currents; the relation of electrical energy to heat; and hence its relation to mechanical power. In short, that the propositions of mechanics apply to electrical and magnetic phenonema. The c. g. s. system of units is explained, and their relations to the practical units developed. Text-book, Thompson's Elementary Lessons.

In fall term Junior year, General Course, Optics and Acoustics are studied. The undulatory theory is made the basis of instruction; and hence the fundamental properties of the wave-surface are examined. Text-books, Optics, Lommel; Acoustics, Tyndall. The Juniors, of this term, in the Engineering Courses, continue the study of electricity and magnetism. The Dynamo is made the basis of instruction. Text-book, Thompson's Dynamo-Electric Machinery.

The Laboratory Instruction in Physics comes in the fall terms of both Junior and Senior years, in the M. E. Course, and in fall term of Junior year in the other courses. The exercises are progressive and entirely quantitative; illustrating general laws in all branches of Physics. The work consists of the theory and use of instruments of precision; their calibration; the determination of physical constants; the measurement of mechanical, thermal, optical, acoustical, electrical and magnetical properties of bodies; in such order and to such extent as the equipment of the Laboratory will permit.

APPARATUS.—The value of physical apparatus owned by the Department is about $8,000, among which are: a standard of length, a standard clock, a physical balance, a chronograph, a cathetometer, a calorimeter, resistance

coils, wheatstones bridge, current and potential galvanometers, high and low resistance reflecting galvanometers, a condenser, a standard B. A. Ohm, a Kew magnetometer, an electrometer—these are all, with the exception of the clock, imported apparatus from the best European makers. A Thompson-Houston dynamo (old pattern), several motors and the electric light circuit on the grounds afford opportunities of studying this branch of electrical science. Through the courtesy of the Steward the electric light plant is made available to students to make such tests and measurements as actually obtain in practice.

In comparing the above facilities with what is offered in the Mechanical Engineering course, it is readily understood that the elements of electrical, engineering, both theory and practice, are open to the student. The Laboratory used by the department, at present, consists of the physical lecture and apparatus rooms, and the two draughting rooms in the third story, elsewhere described. It is hoped that this strange anomaly will be rectified within another year.

ASTRONOMY is a five hour elective in the Senior year. Text-book, Young's General Astronomy. As aids to the study of this subject, the department has a fine celestial globe 32 inches in diameter, a sextant, reading to 10 seconds of arc; a telescope of 2½ inch objective, equatorially mounted, right ascension and declination circles attached; and a two prism Browning spectroscope.

SPHERICAL TRIGONOMETRY is a one hour study in fall term Sophomore year. This time is thought sufficient to familiarize the student with the fundamental theorems of this branch of mathematics; and, to give sufficient practice so as readily to apply the same in problems relating to theoretical mechanics, geodesy, and its simpler applications to spherical Astronomy.

ADVANCED PHYSICS may be taken in Senior year; students looking forward to this work should be classified in Analytical Mechanics, and Calculus of Junior year. This work consists of two parts: (1) Laboratory work at least six hours per week; (2) Text-book work five hours per week.

For further information relating to work in this Department address,

J. C. HAINER, *Professor.*

CHEMISTRY.

Instruction in inorganic chemistry begins with the Sophomore year and is required in all the courses except the ladies course. During the first half of the year three recitations and lectures per week are devoted to descriptive and theoretical chemistry. The laboratory practice, six hours per week, is intended to illustrate the principles studied in the class-room, each student being required to perform all the necessary experimentation. In order better to train the student's powers of observation he is required to describe the apparatus used and the phenomena observed and to trace the relation of the results to the principles which underlie them. In the second half of the

year, the same general plan is pursued in the recitations and lectures, with the addition of practice in solving problems, writing reactions, and the study of the principles of qualitative analysis. The laboratory work, six hours per week, is devoted to qualitative analysis, consisting of a study of solubility, the examination of known material, and a separation of unknown mixtures. This term's work is required in the course in Science and Agriculture and in the Mechanical Engineering course.

Quantitative analysis in the first half of the Junior year consists of density, gravimetric and volumetric determinations and separations, using first pure chemicals and afterwards impure substances. The laboratory work occupies nine hours per week. In addition to recitations upon the principles and methods of quantitative analysis, the student makes an elementary study of oxidation and reduction.

The study of organic chemistry in the second half of the Junior year is experimental and theoretical, using Remsen's Organic Chemistry as text-book and laboratory guide. There are three recitations and three hours per week of laboratory practice.

Agricultural chemistry in the first half of the Senior year consists of an elementary study of soils, manures, plants, milk and kindred substances.

The study of organic chemistry in the second half of the Senior year consists of qualitative and quantitative analysis of organic compounds, comprising a study of known materials and followed by an analysis of unknown organic mixtures. The text-book is Prescott's Proximate Organic Analysis. This is a "four hour" elective in the course in Science and Agriculture, open to students who have taken all of the above prescribed and elective work in chemistry, and in the order in which it is here laid down.

The work in the Veterinary Course is done during the Junior year and a portion of the Senior year. The work is introduced by an elementary study of general chemistry, followed by a short course in qualitative analysis. This is followed by a short study of organic chemistry and urine analysis. Chemical and microscopical examinations are made of urine, in both its normal and abnormal conditions.

Students may take additional hours of work in chemistry in any of the lines of study here outlined by complying with rules of the faculty governing electives.

The Laboratory furnishes room for one hundred students working at one time, and is supplied with gas and water at each table. Ample facilities are offered for all the work described.

The work offered in chemistry is sufficiently extended to furnish the student a good foundation for further study and research, either as an original investigator or as a practical chemist. The work is recommended as much for its educational value as for its practical utility. Students in chemistry are charged simply the actual cost of the chemicals and other materials used or destroyed in the prosecution of their work.

A. A. BENNETT, *Professor.*

BOTANY.

The elementary course in botany begins in the second term of the Freshman year. In this course the Morphology of Flowering Plants will be taken up, and the student is expected to become familiar with roots, stems, leaves, and flowers; the terms used in descriptive botany, and the methods of determining the botanical names of plants. In addition to the regular class work each student is required to do some field work. Text books: Gray's Lessons in Botany, and Gray's Manual.

In the first term of the Sophomore year, students are made familiar with the most important orders of the flowering plants. In addition to the systematic work the student spends one afternoon a week in the laboratory, studying the tissues of Phænogams and Vascular Cryptogams from a physiological standpoint. In addition to the class work each student is required to make a collection of seventy-five species of Phænogams. Text books: Gray's Structural Botany, Goodale's Physiological Botany. The course will also be supplemented by lectures.

In the second term of the Sophomore year Cryptogamic Botany is taken up. Special attention is given to "rusts," "smuts," "molds," "mildews;" especially to such fungi as are injurious to cultivated crops. This course is accompanied by lectures on the morphology and life history of different fungi, algæ, lichens, and vascular cryptogams. Students in the general course are allowed to elect Bacteriology, which is a required study for the Senior Veterinary students. The laboratory work consists of studying the germs of various diseases, and methods of cultivation. In addition to the laboratory work there will be one lecture a week with special reference to sanitation and the means of preventing contagious diseases. The lectures may also be elected in the Course for Ladies.

Pharmaceutical botany has been specially arranged for students in the Veterinary course. In the laboratory some of the principal medicinal plants are taken up, supplemented by a course of lectures. Students in the Junior and Senior years have ample opportunity of studying forage plants, origin of cultivated plants, diseases of plants, and the application of various fungicides.

In the first term of the Senior year the Civil Engineering students spend two hours per week in a study of the microscopical structure of various woods and such fungi as are especially destructive in causing rot of railroad ties, timbers of bridges, etc.

Students specially interested in botany may continue their studies in that branch through the Junior and Senior years. The facilities for such special work are ample. The laboratory is well equipped with apparatus for the anatomical investigation of plants, and the herbarium, including all groups of plants, furnishes means for excellent advance work in systematic botany. Candidates for the second degree have abundant facilities for the pursuit of special lines of investigation in the various branches of botanical science.

L. H. PAMMEL, *Professor.*

APPARATUS.

The Botanical Laboratory is supplied with 24 good working compound microscopes, each having a one-half and a one-sixth objective, giving sufficient power for all ordinary botanical work. In addition to these objectives, the Laboratory has three one-twelfth Leitz oil immersion objectives, besides a one-eighth and a one-twelfth Tolles water immersion. The Laboratory is also supplied with a fine R. & J. Beck binocular, with all accessories. The Laboratory is fairly well fitted up for doing bacteriological work, being provided with a steam sterilizer, after the Koch pattern, a breeding cage, plates, plate holders, cooling apparatus, etc. Thus giving the veterinary students increased facilities for prosecuting this important branch in connection with their work at the College.

ZOOLOGY, ENTOMOLOGY AND GEOLOGY.

In these studies laboratory work is required so far as possible, depending upon the size of classes, material available, etc., and this work is elaborated or discussed in class exercises, lectures, recitations, preparation of special papers, essays, etc.

ECONOMIC ENTOMOLOGY.—A course of about thirty lectures upon injurious and beneficial insects, insecticides and remedial measures. The principal groups of insects are defined and each student examines typical forms, makes a collection of common species and prepares a descriptive paper from personal study of some selected insect. Required of students in the course in Science and Agriculture, and optional for ladies. Second term, Freshman Year. Packard's "Entomology for Beginners."

ZOOLOGY (*General Morphology.*)—An introductory study of animal structures. Dissection of types, especially the starfish, earth worm, clam, crayfish and frog. (*Systematic, with comparative histology and embryology*) microscopical studies of representatives of the various animal groups, proceeding from the simplest to the highly specialized forms, and intended to furnish instruction in the methods of Zoological research. Lectures; text and reference books: Orton, Packard, Claus-Sedgwick, Huxley, etc. Laboratory guides, Colton's Practical Zoology, Brook's Hand book. Second half Sophomore and first half Junior year.

ENTOMOLOGY.—Two lectures or recitations and three afternoons laboratory work per week in fall term dealing with minute anatomy, embryology and classification of insects, and furnishing also additional practice in methods of Zoological research. Comstock's *Introduction*, Packard's *Guide*, etc., offered as elective to students who have ranked sufficiently high in antecedent studies.

Advanced or special work may be elected in the Senior year, which may consist of vertebrate dissection, (Parker's Zootomy) or Elements of Embryology (Foster and Balfour) and special studies on life histories of

selected forms with preparation of thesis. Candidates for second degrees may continue such work with opportunity to pursue original investigations.

GEOLOGY.—This embraces a study of the Principles (Le Contes Elements) a review of the Geology of Iowa; a study of typical fossils and preparation of rock sections; essays on economic geology; geological maps, etc. Five exercises per week of first term Senior year. Elective in General and Ladies' Courses; required of Civil Engineers.

Students in Veterinary course are given two exercises per week second term of first year and three exercises per week in first term second year in Zoology, and two exercises per week in second term, second year on Animal Parasites.

Teachers in other schools, who desire to spend a portion of their summer vacation in special work are allowed opportunities for work in the laboratory upon such lines as can be profitably pursued.

The Zoological Laboratory is supplied with twenty-five microscopes, various microtomes, including a Thoma, and other apparatus for microscopical study and gross dissections. A supply of marine animals properly preserved for laboratory work furnishes means for study of forms otherwise inaccessible to inland students.

The museum arranged with special reference to students' use contains typical examples in all the principal groups. A buffalo, Rocky Mountain sheep, and other large mammals, a very complete set of Iowa birds, an unusually large alligator and the set of marine invertebrates are among the more striking features of what is considered one of the best working collections in the west.

The collection of insects most of which is at present kept in the laboratory rooms at North Hall has received especial attention and is of particular value to students of the Iowa species.

The museum rooms as well as the laboratory are open to students for the direct study of specimens. Visitors are admitted every week day from 9 to 12 A. M., and 1 to 5 P. M.

HERBERT OSBORN, *Professor.*

PHYSIOLOGY.

In the second term of the Junior year the study of comparative and human anatomy and physiology is taken up in a course of lectures and text-book exercises throughout the term. The general and special facts of biology and the anatomical structures of the various organisms are described with as much minuteness of detail as the time will admit, followed by a resume of the subject, in which the evolution of the different systems of organs is traced from their earliest beginning to their most differentiated forms. The course is introduced by lectures on comparative embryology.

D. S. FAIRCHILD, *Professor.*

BIOLOGICAL WORK.

By combining the different biological studies of the General Course with certain studies of the Veterinary School, it will be seen that a student can devote two years almost exclusively to biological work. Those who desire to spend only a limited time, and who are not candidates for degrees, may, if properly prepared, select entirely from studies in these branches. The selections possible are as follows: First term: botany, zoology and entomology. Second term: histology, botany, physiology and zoology or embryology. Third term: botany, histology, physiology, bacteriology and anatomy or paleontology. Fourth term: zoology, pathology, comparative and human anatomy and botany.

AGRICULTURE.

In offering a course in Agriculture to those who are to become our farmers in the future, we recognize:

(1) That it is native ability that makes the successful man in any line of work, regardless of education.

(2) That any education is a *help* to a farmer.

(3) That a man may be perfectly successful on the farm after a thorough training in any line, classical, scientific, or technical.

(4) That, from a lack of business ability, a man may fail as a farmer after the best college training in Agriculture; education only makes more effective, but cannot *change* the powers of mind which nature has given.

(5) That the best years of life for College work are also the best years for acquiring a business knowledge and training; and, on that account, the College graduate is at a disadvantage, when first entering active life, unless he has associated his College work with his later occupation.

With these facts in view, the purpose of the Course in Agriculture is to furnish, to those who wish to be farmers in the best sense, an opportunity to acquaint themselves with some of the many scientific questions which their daily work brings forcibly before them; to enlist their efforts in working out problems yet unsolved; and, by a study of the applications of scientific truth in daily practice, to deepen and make enduring that intelligent interest in their work which makes the difference between delight and drudgery in the performance of any labor.

SCOPE OF INSTRUCTION.

The *main studies*, aside from English and Mathematics, are Chemistry, Physics, Botany, Zoology, Geology, Veterinary Science, and Bacteriology—which see under their appropriate heads.

The following is a partial statement of the more distinctively agricultural part of the work.

Freshman year; first term: breeds of live stock; forms of animals; the zoological classification of the domestic animals; the principles of heredity and their application to the breeding of live stock.

Sophomore year; first term: brief notice of the chemical composition and physical properties of air and water in their relations to the soil and plants; classification of soils; tillage; tillage implements; the grasses and cereals; clover and forage plants; rotation; saving and applying manure; farm machinery, history of development and principles of construction; farm buildings, principles of design and construction; farm accounts; general farm management; employment of men, etc.

Junior year; second term;—dairying; dairy breeds; profitable feeding for milk, at different seasons and under different conditions; the physical properties of milk; its chemical constituents; physiology of milk secretion; different systems of raising cream; of making butter; salting, packing and marketing.

To illustrate and demonstrate the various problems there is upon the farm a dairy of seventy cows, composed of pure Shorthorns, Holsteins and Jerseys, with their grades. The dairy barn is ample for eighty cows, and has facilities for storing food and making experiments upon a corresponding scale. The creamery is a substantial structure, with a fair supply of dairy apparatus.

With a fair knowledge of the sciences on which agricultural practice is based, the student in the Senior year is prepared to take up the more difficult questions that pertain to farm operations.

Among the important topics are the following: Veterinary anatomy and medicine; analysis of milk, feeds, manures, soils, etc.; stock feeding; drainage; climatology; the origin and formation of soils; their physical and chemical properties; the soil as a source of food to crops; production of organic matter; source and formation of the nitrogenous constituents of plants; of the ash constituents; their importance and distribution; theory of manuring; composition, value, manufacture and application of manures and fertilizers; ability of soils to absorb and retain fertilizing matter from solutions; loss by drainage; by removal of crops; "law of minimum;" extensive and intensive farming, etc.

The farm barns are quite extensive, and as far as the funds will allow will be fitted up with the best arrangements for stabling stock.

Of pure-bred animals the farm has Shorthorn, Holstein and Jersey cattle, Clydesdale horses, Shropshire sheep and Poland-China swine as specimens of the respective breeds, and to illustrate the principles of heredity, etc.

It is intended that as far as these individual animals are kept as representatives of different breeds, they shall be the best of their kind and a credit to the College.

In the dairy the greater part of the cows are high grades of the three breeds named above, which supply the class in dairying with material for practice, and the Steward's Department with milk.

The excellent Veterinary Department of the College gives rare facilities for the study of the anatomy, physiology, hygiene, diseases, treatment and care of domestic animals; and the agricultural students are given every opportunity to avail themselves of these facilities.

L. P. SMITH, *Professor.*

HORTICULTURE AND FORESTRY.

These studies form a part of the Course in Science and Agriculture. Singly and alone the time allotted to this technical line of study and practice could accomplish little more than to make the student familiar with some of the leading modes and methods of empirical gardening, considered mainly as a mere art. Supported, however, by the full course in natural sciences, the routine of horticultural operations rises above the level of unreasoning custom to the rank of applied science. The cultivated plant becomes a thing of life, varied in vitality, habit of growth, and fruitfulness by conditions of soil and air more or less under control.

The studies begin with the second term of the Freshman year. No text books are used in this or the Sophomore year, as in the consideration of the subjects of small fruit-growing, orcharding, lawn-planting, flower-border, and forestry, we have no text book as yet adapted to our prairie soil and climate. Instruction is imparted by lectures, making every possible use of the many instructive object lessons of the grounds, the nurseries, the orchards and the horticultural museum.

The supporting studies in botany, chemistry, entomology, agriculture, etc., fit the Junior class for the intelligent consideration of theoretical horticulture as outlined in "Lindley's Theory of Horticulture," enabling the student to comprehend important principles pertaining to vital force, germination, root and stem growth, leaf formation and functions, climatic adaptation, etc., intimately associated in our State with failure or varied degrees of success in all horticultural operations.

MEANS OF PRACTICAL ILLUSTRATION.

1. The vegetable gardens.
2. The flower borders.
3. The ornamental grounds.
4. The experimental nurseries.
5. The experimental orchards.
6. The small fruit plantations.
7. The forestry plantations.
8. The propagating rooms.
9. The propagating pits under glass.
10. The collection of native and cultivated woods.
11. The collection of injurious and beneficial insects.
12. The set of abnormal and diseased growths.
13. A set of fac-simile fruit casts.
14. The horticultural museum, now accumulating.

LABOR.

To illustrate each branch, and enable the student to become familiar with methods and processes, and to acquire some skill, he is expected to engage in such labor as will best promote a knowledge of the particular study in hand for about five hours each week under the instruction of Professor or foreman. Such labor combined with instruction is, in the course of study, denominated "Field Lectures with Practice" or Farm and Garden Instruction.

J. L. BUDD, *Professor.*

PHILOSOPHY.

PSYCHOLOGY.

The study of Psychology supplies two wants. First: It gives an analysis of the intellectual powers and discovers the laws of thought, thereby enabling the student to think with greater accuracy and clearness on any subject; and since success in every kind of activity depends on clearness of thought, psychology is one of the most "practical" studies.

Second: Psychology as taught here clearly sets forth the fundamental principles and mutual relations of the industrial sciences, the incipient unit in each, the processes of experimentation, discovery and research, and the underlying principles of association which render the classifications of the various sciences possible, and naturally place the industrial sciences in closely related groups.

The study occupies five hours per week of recitations and lectures the first half of the Senior year. Welch's Psychology is used as a text book. It is supplemented by lectures and by library work, with Hamilton, Cousin, Porter, Spencer, Bain, Ladd and Dewey as the principal collateral works. Written essays and discussions are required from each member of the class.

W. I. CHAMBERLAIN, *Professor.*

ETHICS.

The last term of the Senior year is devoted to a study of the groundwork of moral science. This study follows pyschology or mental science in the course, because it must rest fundamentally upon it. Cutler's Beginnings of Ethics and parts of Janet's Theory of Morals are used as text books, supplemented by library work and by lectures; the main object of the whole being to impress upon the mind of the student the belief that man has a moral nature, that this world is, for man, a moral world, created and ruled by a Moral Being for moral ends; that, in no narrow sense, "honesty is the best policy;" that is, right conduct morally is the wisest settled principle of action; that our spiritual environment favors right condnct; that there is "a Power not ourselves that makes for righteousness," and that it is, in the highest sense, wise to work with, and not against, that Power; and, finally, that the Christian Scriptures, apprehended by our reason, are on the whole

our best means of learning what is the mind and will of that Power. Principles are sought; mere questions of casuistry are avoided. The last four weeks of the term are devoted to lectures on Civics; a careful study of our Republican Government, and especially of our rights and their limitations under, and our duties towards, such a Government.

W. I. CHAMBERLAIN, *Professor.*

POLITICAL ECONOMY.

In this division of social science are taught, by text-books, familiar lectures and discussions, the laws of labor—its products and their costs; the principles of capital, money, foreign trade, tariff, taxation, and all the influences that quicken or retard exchange. The student thus gains a thorough acquaintance with the scientific data that underlie and regulate industry, and becomes familiar with the principles that should determine all questions of public policy concerning which there is so wide a diversity of opinion.

COMMERCIAL LAW.

It is the aim in this study to present the general principles of law relating to ordinary business transactions. Contracts, agency, partnership, sale of goods, commercial paper, and real estate are studied. The changes in the common law, made by the statutes of the State, are set forth by means of lectures. Particular attention is given to the forms of notes, bills, drafts, checks, etc., and by frequent reviews and examinations the student is made familiar with the requisites of the more common business papers.

E. W. STANTON, *Professor.*

LITERATURE, LANGUAGE.

ENGLISH COMPOSITION AND APPLIED RHETORIC.

Instruction in English Composition is given during the first half of the Freshman year. The correct expression of thought through written language is taught, and enforced by frequent exercises. A clear knowledge of the grammatical structure of the English sentence is sought. A thorough knowledge of spelling, punctuation and the proper use of capitals is presupposed, but if found to be lacking on the part of any, special extra drill is given, and work required.

In the secoud half of the Freshman year the time of three recitations each week is devoted to a series of exercises in applied Rhetoric, in which the design is to familiarize the mind with those details of composition and expression, which are most in requisition in practical life, and are usually most neglected; going no further in the philosophy of this branch than these practical ends will indicate and permit. The attempt is to teach the pupil to express his thoughts clearly and forcibly by means of written language.

E. A. KIRKPATRICK, *Instructor.*

ELOCUTION.

The system of instruction in expression is that taught in the Emerson College of Oratory, Boston, and is based upon the discoveries of M. Delsarte and Dr. Emerson. Its object is to secure the health and freedom of the body, sweetness and volume of voice, and the culture of the mind.

Talks on Physiology, as connected with the study of expression, will be given throughout the course.

Recitals are given occasionally in each class.

FRESHMAN YEAR.

FIRST TERM.

Gesture—Relaxing exercises for all parts of the body.
Voice—Direction of Tone.
Rendering—First step. Analysis.

SECOND TERM.

Gesture—Exercises for promoting dignity of carriage and grace of movement.
Voice—Exercises for freeing the throat and increasing the resonance of the voice.
Rendering—Second and third steps. Analysis.

SOPHOMORE YEAR.

Gesture—Review. Analysis of gesture exercises. Attitudes.
Voice—Review. Exercises for flexibility of speaking voice.
Rendering—Third and fourth steps. Analysis.

JUNIOR YEAR.

FIRST TERM.

Gesture.—Review. Responsive Gesture.
Voice.—Review. Additional Exercises.
Rendering.—The four steps, with special drill on the fourth step.

SECOND TERM.

Gesture.—Advanced Gesture.
Voice.—Review.
Rendering.—Critical study of one of Shakespeare's dramas.
Study of orations.
Delivery of orations.

ENGLISH LITERATURE.

Three hours each week during the first term and five hours each week during the second term of the Junior year are devoted to the study of English Literature. There are three courses—first, a course in English Prose from Mandeville to Macaulay, in the first term: Secondly, a course in English Poetry from Chaucer to Cowper, and a third course in American literature, in the second term. Lectures are given; the student is required to write a series of studies of the chief authors; and selected works are read and criticised.

A. C. BARROWS, *Professor.*

LATIN.

The study of Latin is confined to the Freshman year of the course in Science, and the Freshman and Sophomore years of the course for Ladies. As so few of the patrons of this College are able to secure instruction in Latin at their homes, a beginning class will be formed. The Freshman class will be carried through Ahn-Henn's *Short Latin Course.* The Sophomores will read Cæsar and Virgil.

Latin is studied in this College chiefly as a means of learning the principles of language, the etymology of English words, and the principles of English syntax. It is also a valuable aid in learning the nomenclature of the sciences pursued here. The attempt is to teach it in the way best adapted to promote these ends. In the view of Trustees and Faculty, the object of the College, as set fourth in the law of Congress making the land grants that form the munificent endowments of this and similar State colleges, does not require that extended study of the Latin language and literature which may be desirable in colleges founded in another way and for a somewhat different purpose. Such knowledge is acquired as shall be valuable in itself for the purposes named, and shall fit the pupil for further study himself should occasion require, and enable him to teach Latin in any ordinary school. The Greek language is not taught.

A. C. BARROWS, *Professor.*

FRENCH.

French is an elective study in the Freshman and Sophomore years in the Ladies course, and is obligatory in the Freshman year of the Civil and Mechanical Engineering courses. The primary object in the study of French is reading, therefore only so much of the grammar is taught as will facilitate fluency of translation.

During the first term, Freshman year, attention is given to pronunciation and to exercises both oral and written.

Thorough drill is given in verbs and the student has some practice in translation. In the second term the student will have mastered the most of Part I.

of Otto's French Grammar, or its equivalent, including the irregular verbs and will devote much time to translation.

At the end of the year, he should be able to read ordinary scientific works or text-books in French.

In the Sophomore year, the grammar is finished and standard French authors are read.

GERMAN.

The study of German is confined to the Junior year and first term Senior year. During the first year the student is instructed in the principles of grammar, and gains a knowledge of declension, gender and conjugation so that he may with ease translate ordinary German prose. "Otis' Elementary German" and "Grimm's Maerchen" are used. The third term is devoted to reading Schiller and selections from the best German novelists, while special attention is given to reading at sight.

This short course is not sufficient to give one a mastery of the language nor make him familiar with its literature.

The object in view is that of securing a reading knowledge of German. By the methods pursued, the student gains a practical vocabulary and may with a little practice, write and speak with correctness.

MISS LILLIE M. GUNN, *Professor.*

HISTORY.

In the Ladies' course History is taught, two exercises each week, through the Sophomore year. In the other courses it has five exercises each week in the first term of the Freshman year.

The History of England is carefully studied, with special reference to those institutions and ideas which receive their final developement in the Constitution of the United States.

HISTORY OF CIVILIZATION.

During the second term of the Senior year, one hour a day is given to this study. The class first makes a rapid review of the progress of the race, using Andrews' Institute of General History, which is supplemented by a course of lectures. The class is then divided into sections for the more careful study of the History of selected civilizing forces. In this part of the course the hour is mainly occupied in hearing written reports from members of the class appointed to pursue, in the library, special lines of research.

A. C. BARROWS, *Professor.*

MILITARY SCIENCE AND TACTICS.

It is not intended to complete the education of the thorough soldier, but to fit young men for filling intelligently positions in the State troops as line officers and company instructors. The constant demand for men thus trained emphasizes the value of a thoroughly organized and well sustained military course. The chief advantages derived are the acquirement of a dignified carriage of the person, a gentlemanly deportment and a self-respecting discipline, with habits of neatness, order and punctuality. Opportunities are afforded each cadet for extending the studies in military science as desired, the College being provided with the necessary arms, accoutrements and outfits for drill and instruction in the infantry, artillery, and signal tactics, for which special classes will be formed. Lectures on military subjects are delivered throughout the course, and regular battalion drill and dress parade take place each Wednesday and Friday afternoon. All male students of the College, except such as may be excused for good reason by proper authority, are required to become members of the College battalion, and wear the prescribed uniform during military exercises.

CAPT. J. RUSH LINCOLN, *Professor.*

THE COURSE FOR LADIES.

This course is much the same as the general course for gentlemen, except that more time is devoted to language and literature, and less to pure and applied science. A careful examination of the arrangement of studies, (see tabulated arrangement, page 33), will show that a lady may pursue a language study throughout the course and combine with it any two of the five named sciences. A lady student, for example, may take two years of Latin and two years of German or two and a half years of either Latin or German and a year and a half of French. In addition to the other literary studies the lady student takes botany one year and has the choice of any two of the following sciences, viz: mathematics, physics, chemistry, zoology, and vegetable physiology. Opportunities are given, to such as desire it, to take lessons in music and painting, and the very best instruction is provided in both these branches. Students in addition to recitations and lectures upon the various topics in domestic economy receive practical training in all branches of housework and general household management. They are not required to perform a greater amount of labor than is necessary for the desired instruction. Other courses, especially the Course in Science, are also open to ladies.

DOMESTIC ECONOMY.

It is the purpose of this Course to interest and instruct the young women attending the College in the manifold and complex duties relating to the home.

The topics taken up in the lecture room are chosen with a view to securing to the student a knowledge of practical and systematic methods of rendering home a pleasant and healthful abode.

The laboratory practice is conducted upon the principle that no calling requires for its perfect mastery more of practice combined with theory than that of the housekeeper.

The course in the second term Freshman year is devoted mainly to the study of the Boston School Kitchen as a text-book, combined with laboratory practice.

This text-book gives instruction in regard to the elements contained in our daily food and their proper combinations. Also the right adaptation of food to age, temperament, occupation and climate, as based upon scientific principles of hygiene and dietetics.

In the first term of the Sophomore year special attention is given to the cooking and serving of meals, the purchase and care of family supplies, and to general household management, including household accounts. Also invalid

cookery, the care of the sick and special hygiene, consisting of a course of lectures on the laws of life and health, especially woman's health and well being.

During the last term of the Senior year there will be a general review of the work here outlined in preparation for the systematic and intelligent performance of the serious duties and responsibilities, which it is woman's highest privilege to assume in her capacity of housekeeper.

MRS. ELIZA OWENS, *Instructor.*

MUSIC.

An opportunity is given to such as desire to take private lessons on the Piano-forte the Pipe Organ, in Voice Culture and in Harmony. Classes are formed each term in sight-singing and advanced chorus work.

In the study of the Piano-forte the pupil is required to pursue the most thorough modern system of technical training practicable. Only the compositions of acknowledged masters are used in instruction. Pupils may complete the first four grades of the New England Conservatory of Music, and enter the fifth grade in that institution without examination.

Students are advised not to begin the study of the organ until they are able to play with proper phrasing and execution Heller's Studies Op. 47. Special attention is given in this study to the art of accompanying, to the study of registration and pedal phrasing.

In the cultivation of the voice attention is first given to the development of the same timbre and purity of tone throughout the entire compass of the voice, correct management of the breath, vowel formation, distinct articulation and expression.

In Harmony, the attention of the pupil is drawn to the treatment of intervals, chord progressions, modulations and the writing of chorals.

The College has recently been furnished throughout with new Knabe pianos. It also has a two-manual pipe organ, with two octaves of pedals and a variety of registers.

EXPENSES.

For private instructions, two half hour lessons per week for the College term $15.00. Pupils may take one lesson per week at the same rate. Single lesson sixty cents. No deduction will be made for temporary absence from lessons.

Class lessons per term $3.00. Instruction is given in Sight-singing to members of the Freshmen class *free.*

Use of piano one hour each day forty cents per month or $1.50 per term. For the use of the organ, a blower's fee of ten cents an hour.

MISS EVA F. PIKE, *Instructor.*

SUMMARY OF STUDENTS IN THE DEPARTMENT.

Private instrumental	41
Private vocal	22
Sight-singing	61
Chorus	37
Harmony	3
Not enrolled in any other department of the College	13
Number taking two or more music studies	29

THE COURSE IN MECHANICAL ENGINEERING.

The Course in Mechanical Engineering does not aim to make machinists though including thorough teaching in machine work. It assumes it to be the business of the mechanical engineer to contrive and operate means for converting the materials and forces of Nature to his own ends, and that the design, construction and supervision of machinery constitutes his chief work.

The following are the foundation principles upon which it is aimed to build up this course:

The greatest possible breadth of general education;

Complete mastery of fundamental engineering principles;

The actual performance of some Engineering Work involving scientific methods in construction, investigation and design;

Unceasing contact, from the beginning to the very end of the course, with the science of mechanics, its applications, measurements and the study of its laws.

The regular four years course leads to the degree of Bachelor of Mechanical Engineering. When completed a fifth and sixth years may be taken for the higher degree of Mechanical Engineer, in such studies as the student chooses under the approval of the head of the Department and of the Faculty.

THE COURSE AND PLAN OF INSTRUCTION.—The student entering in Freshman year, aiming at mechanical engineering as his profession, needs first of all to know the goal before him—What engineering is. All available means are taken to familiarize him somewhat with ordinary engineering processes and the highest achievements of great engineers. In every case work has been done upon materials; he at once begins work in the shops, and from this practical basis learns what work is, with its continuous effort and system; also what his materials are. But work has a scientific basis. To construct, without waste, a machine; one which works, is durable and economical; demands measurement, calculations, close planning. He is taught by actual measurements of his own, with rule, watch and scales, to find the horse-power of the shop engine with simple apparatus, and learns the exact meaning

of "work." He measures the power used, and work done by his lathe, and learns the simple relations of "power," "work," "force," "time" and "space," what "mass" is, and what are its relations to the other quantities. So he begins his acquaintance with the laws of mechanics under which he has chosen to work.

He must also have clear ideas of the properties of materials, and soon he is shown how to measure the strength, elasticity and stretch of iron, steel and wood with the testing machine. Other qualities, not capable of precise measurement, become familiar from the work and instruction of the Shops.

Since designing is a chief end, he at once begins †drawing, which has aptly been called the "language of design." In using and making drawings he reads and writes this language, and learns at length even to think in it if thoroughly trained in descriptive geometry.

Besides the work just named, the Freshman studies include the ordinary English branches and certain subjects required as the first work of the other courses. Some of these, as mathematics and French, prepare directly for later work in engineering, while others are valued as increasing the mental grasp so much needed by all engineers.

In the Sophomore year the principles named as regulating the choice of work again find application. Military drill and general scientific studies in physics and chemistry, including chemical laboratory work, are taken with the students of the other courses. Special lectures upon the chemistry of the metals and the study of the physical laws of heat, electricity and mechanics, lead toward Mechanical Engineering, and the same is true of surveying, descriptive geometry and all the mathematics of the year. Mechanical drawing, †elements of design, practice in shop and †test-work are entirely of an engineering character and are fully described further on.

In the Junior year political economy forms, perhaps, the only study of a general character, calculus and the laws of contracts being studies preparatory for engineering work.

Class room work in theoretical engineering begins this year. The study of the steam engine is carried through the first term, and also uses much of the time devoted to drawing throughout the year. The principles of design are considered for each part, valve diagrams and steam diagrams involving inertia, are worked out, the elements of a particular engine are planned by the class, and a short study is made of the graphical statics of mechanisms. Attention is later turned to a variety of valve and link motions, to different types of engines, and lastly to pumps and condensers.

Some of this work is covered by weekly lectures and recitations in the second term, while the remainder is draughting work taken at regular times for that study.

After five weeks study of calculus (which comes daily through the first term), the Juniors begin the mechanics of engineering, taken four hours

† See paragraphs on Practice work given below.
* See Course of Study, page 34.

weekly till the close of the year. This comprises analytical mechanics and strength of materials, and also the opportunity of frequently seeing practical application of these studies, in actual measurements of power and tests of materials.

The physics taken by the Engineers this year is specially chosen for their needs, and deals wholly with heat, mechanics and electricity.

It includes both class room and laboratory work, and gives them just the knowledge of electricity required by those graduates in Mechanical Engineering who intend starting out in the practical work of electricity for which there is now an extended field.

In fact, for all electrical measurements and similar instrumental work, there is quite as full an equipment as in schools giving the so-called Electrical Engineering Course, now becoming so common.

Some provision for an electric power laboratory is alone required to furnish all that is needed for such a course, and will without doubt be supplied as the demand for it, already pressing, gains further strength.

In Senior year English literature is taken for one term as being a study indispensable for every educated man, and at this point finds fuller appreciation than if coming earlier when, also, the time is more needed for subjects preparatory to purely technical work.

The theoretical and applied engineering studies of this year are of great interest and importance. Kinematics and mechanics of machinery, involving as they do systematic treatment of machine motions: of the conversion of external forces into work after transmission through the parts of a machine, and of methods of proportioning these parts to the stresses they carry—these are the studies which claim chief attention, and average five hours weekly of class room work throughout the year.

Machine drawing and designing comes twice a week, both terms, and the graduating thesis, the requirements for which are *elsewhere given, is begun in the first term and is allotted the time of a "five hour study" for the entire second term.

For Senior first term subjects we have thermodynamics with problems on "Heat as used in Prime movers" as a four hour study, heat engines and boilers twice weekly with practical considerations of design, and shop work for one day of each week.

The studies of the second term are: One hour in graphics of framed structures. Two hours in hydraulics, a subject of growing importance as electric transmission of energy is being gradually perfected. Two afternoons devoted to physical laboratory work, chiefly electrical in character. And a full day each week to experimental work in engineering tests, fully explained below under "engineering laboratory work." One lecture a week on the materials of engineering, and the most important engineering structures and processes will also be given during the second term of the year to the Senior and Junior classes. Library references are used with more or less

* See pages 29 and 30.

freedom, and examination are set both for these and for matter considered in the class room.

Besides the regular class room work one hour weekly is devoted to review of the best engineering journals by the Juniors and Seniors of both Civil and Mechanical Engineering Departments, in which the instructors also take part.

PRACTICE WORK—As given in this course may be put down under three heads as follows: Shop work, drawing and design, and engineering laboratory work.

SHOP WORK—Is designed to give familiarity with the arts of engineering by eight or nine hours weekly spent in work in the shops. While the evident value of making complete articles is recognized, every mechanical principle involved, and all the capabilities of the various machine tools must surely be mastered.

To compass this in such limited time, exercises, carefully chosen and systematized have been adopted, in which skill in manipulation and evident application of mechanical principles are put first, useful production being a secondary, though a desirable end. This method, universal in teaching chemistry, is equally good here. In this way the shop-work can be made progressive, from simple processes to those more difficult and involving greater skill.

As the system is perfected, and in proportion to the skill displayed by individuals, the interest and benefit coming from "making something of use" to plans laid out on paper, can be reached.

The material used, is furnished the student at lowest wholesale rates, and to cover this expense each one is required to deposit $5.00 at the opening of the term, the balance being refunded at the close.

Each student provides himself with a few of the tools he most uses, a list of them being furnished him at entrance. All others are furnished as needed from the tool room on the "brass check" system now used in all good machine shops.

In all the work of the shops, students are on duty for the particular exercise shown by the table for each day of the course, and are assigned to separate machine tools at which they follow each other in regular rotation. In this way all go through with every part of the work, though not necessarily in the same order.

In the practice of the shops, the general knowledge of a superintendent or foreman is first aimed at, while the attainment of individual skill is also sought. The following are the subjects taught:

IN THE WOOD SHOP:—Bench work in carpentery and joinery; wood turning, pattern making, and handling of wood-working machinery.

IN THE MACHINE SHOP:—Vise work with chisel and file, centering, cutting off, drillpress, shaper, planer and lathe-work, also hand turning.

IN THE FOUNDRY:—Moulding, melting and core making.

IN THE SMITH SHOP:—Forging, hardening and tempering, and annealing. To these may be added:—Millwrighting and boilermaking, the shop system

of taking care of small tools, running engines, firing, and care of boilers. There are now in preparation also courses in plumbing, and gas and steam fitting.

THE SHOPS AND EQUIPMENT ARE AS FOLLOWS:—The carpenter and pattern shop is a two story building 30 feet by 50 feet with a wing 24 feet by 32 feet containing the Corliss engine, condenser and air pump, feedpumps, etc.

The lower floor is used for the wood working machines, the second story for tool room and benches at which carpentering is taught.

The equipment consists of seven wood-turning lathes, one pony planer, one mortising machine, one Fay rip and cross-cut circular saw, one jig saw, one 3-foot grind stone, twelve sets of small tools in the tool room, also seventy-five tool lockers.

THE FOUNDRY—Is located in the basement below the West wing of the Machine Shop. It is 28 feet by 61 feet long and contains accomodations for eight students. These consist of moulding tubs, core benches, melting furnace, core oven, spill trough, crucibles, flasks, etc.

Here the student is required to make green and dried sand moulds from patterns designed to bring out the most general principles of brass and iron casting.

Loam moulding is also explained; some work at the moulds while others are making and drying cores and melting brass.

THE MACHINE AND FORGE SHOP—Occupies the entire lower floor of Engineering Hall and is 28 feet wide by 61 feet long with a wing 28 feet wide by 40 feet long, the latter containing a tool room 10 feet by 28 feet.

Machine tools and general equipment comprise: One 20-inch Fitchburg engine lathe, two 16-inch Reed engine lathes, one 16-inch Washburn engine lathe, one 10-inch Prentice Bros. engine lathe, one 9-inch Brown and Sharp universal hand lathe, one 9-inch Washburn engine lathe, one 20-inch Fitchburg drill press, one 22 by 60-inch iron planer, one 7-inch shaper, one Brown and Sharp emery tool grinder, one cutting-off machine, one Springfield Glue and Emery Wheel Co.'s 3 by 20-inch emery wheel for tool-grinding, one 4 by 17-inch buffing wheel, twelve machinists' vises, 73½-feet of vise benches, one 38 by 51-inch Buffalo forge, one complete set of blacksmith tools, one wrought-iron anvil.

The tool room contains thirty-nine tool lockers and five cases of small tools, which are sufficient to meet present wants.

The Shops, and system of instruction there given, are under the care of an efficient shop foreman, assisted by two young men regularly employed to look after the tool room and power plant.

FREE HAND DRAWING.—The instruction in free hand and mechanical drawing is under one control. For the students of the general Course, free hand drawing is taught for one two-hour exercise each week through the whole Freshman year. In the first term this consists of elementary practice in use of pencil, followed by drawing plane figures, conventional designs, and outline sketches of objects. During the second term, linear

perspective is carefully explained, a text-book being used with scale and rule. This is later followed by exercises in free hand perspective, with elementary work in shades and shadows.

For those especially proficient, some time may be found during the year for elementary model drawing.

The Engineers devote the same time to free hand drawing as the other students, but the work is slightly modified, better to adapt it to mechanical training. In the first term, the objects chosen for out-line drawing are usually some piece or cross section of a machine. They study perspective in the second term with the addition of isometric drawing, while somewhat less time is devoted to free hand perspective. Here again the objects drawn are usually engineering constructions of some kind.

MECHANICAL DRAWING AND MACHINE DESIGN.—This is begun in the first term Freshman year and continues through the whole course. Careful pencil work is first taught, the figures chosen being such as are involved in later mechanical and graphical constructions. This work is finished with fine ink lines, and shadow lines are employed where needed. Next comes a study of simple alphabets, followed by neat execution in tracing suitable and carefully made machine drawings.

A set of notes giving the principles of machine drawing, the best methods employed in engineering practice, and the theory of projections, is studied next, and with this, drawing from sketches of machine parts made by the student himself with all needed measurements, each sketch to be complete for use before he is permitted to begin the mechanical drawing. In this work, which is carried through the Freshman year, Prof. C. W. MacCord's "First Lessons" and "Practical Hints to Draughtsmen," are used as text-books or for reference.

The drawing of the Sophomore year consists in making complete plates of elementary machine parts from the tables and formulas, both theoretical and empirical, usually adopted in engineering practice.

Prof. Klein's book on Machine Design is used through the whole year. The required time devoted to this in the first term is limited to one weekly exercise of three hours, considerable of the student's time being used in making the plates of his descriptive geometry. Two three-hour sessions come in the second term.

The Juniors have machine drawing and design for two afternoons throughout the year. Link work, valve gear and cam construction is taken up and some time is devoted to the drawings which accompany the study of the steam engine with which this year begins. When time admits problems are given in designing ingenious mechanisms, often serving as practice in their study of graphics of mechanisms.

In the Senior year, machine design and drawing fill the same time as in the preceding year. The work consists, first, of the design by the different members, of the parts of the steam engine or such other complete machine as may seem best suited to the requirements or ability of the class, and later, of some

design made by each member as a special study, or in cases when the graduating thesis requires an extra amount of work of this character, such drawing may occasionally be assigned to part of the regular hours for drawing.

In all the drawing, students provide themselves with paper, instruments and all necessary equipments, including the drawing boards used in free hand work.

A list of the instruments needed is given each member at entrance, and can if desired be supplied to the students at the very lowest rates.

ENGINEERING LABORATORY WORK.—Besides some simple power measurements made early in the course, and the opportunity to see tests of materials and experiments illustrative of principles as they are taught, a special set of experimental tests is made by the Seniors in their second term. This work occupies the day given to shop practice in the previous term. As far as possible the arrangements for these tests are made by the students themselves from general plans furnished, this being considered a valuable experience.

They are taught to standardize the instruments and to allow for such extraordinary conditions arising to modify the usual methods as are discovered by a careful examination previous to the test.

The importance of having means of checking all results and of making and recording observations with systematic regularity and care is especially insisted on.

Whenever practicable, results are figured out, at least approximately, on the day the test is made, attention being called to the need for special care in observing and computing where slight errors would greatly affect the final result, and to the uselessness of carrying exactness of calculation beyond the limits of accuracy of corresponding data.

The equipment for this work is being constantly increased with a view to more varied and extended experimental tests. Provision is already made for the following:

A boiler test including gas analysis and observation of quality of steam by steam jet and calorimeter methods.

An engine test including dynamometer and indicator power measurements with estimate of quality and weight of steam used.

Efficiency and duty of injectors.

Efficiency and duty of steam pumps.

Efficiency of mechanical power pumps.

Ultimate tensile, compressive and bending strength of wrought iron, cast iron, steel, wood, etc.

Moduli of elasticity of the same.

Strength of welded and riveted joints.

Shearing strength of bolts, nuts and rivets.

The apparatus for this purpose is as follows:—One 35 H. P. horizontal tubular boiler; one 25 H. P. Harris-Corliss engine; one 5-H. P. plane slide valve engine; one Prony brake dynamometer; one No. 9 Sturtevant fan blower, (serving as power absorber): one transmission dynamometer; one

50 H. P. Wheeler's patent surface condenser; one Blake air pump for above: one 2 inch Worthington water meter; one Elliot gas analysis apparatus; one standard pyrometer; one mercury flue thermometer; two Thomson steam engine indicators; one Richards steam engine indicator; four standard thermometers for steam and water; one Dodge injector and Hancock inspirator, fitted for tests; one American Steam Gauge Co.'s engine register; one Schaeffer and Budenberg's tachometer; one 50,000 pound-testing machine. Also scales, steam and power pumps for tests.

Arrangements can also be made for tests of the 35 H. P. Buckeye engine running the Edison electric light station furnishing light to the College, the dynamo machines being also available for certain tests.

It should here be stated that liberal provisions is being made by the Board of Trustees for the needs of this Department. During the past year the Worthington Company donated their 2 inch water meter to the Department especially for this test work, and Mr. F. M. Wheeler, of New York, donated his compound tubular surface condenser valued at $375.00 and furnished the Blake air pump, which goes with it, at a very liberal discount.

Too great value cannot be placed on the experimental laboratory work as a means of fixing true conceptions of engineering principles, of training in scientific observation and equipping the student for actual engineering practice.

It is purposed to enlarge and perfect this work as rapidly as the liberality of State appropriation and the friends of education make it possible.

In this and all work of the course concentration and thoroughness is to be sought before great range of subjects, and unity of effort by making every part of the instruction given, illustrate and reinforce every other.

As far as possible the attempt is made to find desirable employment for graduates, and success in this respect has been all that could be wished. On the other hand graduates can greatly aid the progress of the work of the Department by maintaining communication with and interest in the College after graduation.

C. W. SCRIBNER, *Professor.*

THE COURSE IN CIVIL ENGINEERING.

This course is similar to that in mechanical engineering, and also, though in a less degree, to the science course, as will be noticed upon examination of the several courses of study.

The Freshman year and the first term of the Sophomore year are devoted mainly to preliminary studies including algebra, geometry, trigonometry, land surveying, drawing, descriptive geometry, and language. In the second term, Sophomore year, the principal studies are analytical geometry, descriptive geometry, railroad surveying, (with field practice) and physics. In connection with the class work in descriptive geometry a series of drawing problems comprising some twenty plates, is prepared by each student.

In the first term, Junior year, students have calculus and a continuation of descriptive geometry As in the previous term, the preparation of drawings and practice in the field constitute a leading feature of the work.

In the second term, Junior year, students have analytical mechanics, and the survey and a location of a short line of railroad, including the complete mapping of the same.

During the Senior year the study of bridges forms an important feature of the work. A bridge, including working drawings of all details, is designed during the second term by each student. Such other subjects as retaining walls, specifications and contracts, sanitary engineering, etc., are also studied during this year.

In all studies taught, it is the object to give practical as well as theoretical knowledge, and for this purpose a large amount of draughting and field work is required of each student. The department is well supplied with field instruments, drawings, blue prints models, draughting tables, etc., many of which are the work of its own students.

C. F. MOUNT, *Professor.*

THE COURSE IN VETERINARY SCIENCE.

(A THREE YEARS' COURSE.)

It is the purpose of this Course or Department to train students for practice in veterinary medicine. The anatomy of the horse is the special subject of study, but important structural differences of other domestic animals are carefully noted. The lectures on anatomy are illustrated by means of plates, models, skeletons and prepared specimens of the organs. A convenient and well-furnished dissecting room affords the students every facility far anatomical work.

ZOOLOGY.—In the second term of the Freshman and first term of the Junior year there are two recitations per week in zoology dealing mainly with vertebrates. During this time the student spends one afternoon each week in the laboratory in the dissection of typical forms.

ANATOMY is taught during four terms as seen by the schedule of studies for the Veterinary Course.

HISTOLOGY AND PHYSIOLOGY.—This embraces systematic histology, which is taught by lectures throughout the first term of the Freshman year, and practical histology, including the microscopic study of the tissues of the animal body. The various methods of preparing tissues for microscopic examination are taught with the object of familiarizing the eye of the student with the minute anatomy of the tissues of the animal body.

PHYSIOLOGY is taught in the first term of the Junior year by lectures, recitations and demonstrations. Physiology is carried along with microscopical anatomy. Laboratory facilities are offered to students who desire to engage in original work.

PATHOLOGY.—Pathological specimens of all kinds are brought before the class for the purpose of familiarizing the student with the appearance of diseased tissues. The relations of pathological histology to the principles of medicine and surgery are carefully studied, and the advances made in the application of the microscope to exact pathology fully considered. The use of the microscope in the study of pathological specimens forms an important part of the laboratory work during the last term of the Senior year.

BOTANY.—In the second term of his Freshman year the student acquaints himself with general botany, and gives some attention to the identification of plants. In the spring term of his Junior year the student takes up Pharmaceutical botany and makes a collection of fifty species named and mounted. In the first term of the Senior year Bacteriology and the methods of cultivating bacteria and means of preventing contagious diseases.

CHEMISTRY.—The elementary chemistry is the same as that given in the first term of the Sophomore year of the Course in Science and Agriculture. In the Senior year the work includes the detection of poison; analysis of urine from healthy and diseased animals; examinations of food, and of water; qualitive and quantitative analysis of the secretions in, and excretions from, the body, together with such work as the clinical department may require. Students also compound or make medicines required by the department. During the second term original work is required.

THERAPEUTICS.—The physiological action and therapeutical value of medicines used in veterinary practice are carefully considered throughout the Senior year.

VETERINARY MEDICINE AND SURGERY.—These subjects embrace theoretical and practical instruction in the treatment of diseases to which all domestic animals are subject, as well as the theory and practice of surgery. Members of the Senior class are made familiar with the uses of instruments and the administration of medicines.

CLINICS.—One hour each day is devoted to clinics. The Seniors are required to examine animals for certificates of soundness, diagnose diseases and prescribe for the same.

This Department is really a College of Veterinary Medicine and Surgery, and has the fullest equipments for thorough instruction and practice. The course of study leads to the degree of Doctor of Veterinary Medicine, (D. V. M.)

A THREE YEARS COURSE.—It will be noticed that beginning with 1888 the Veterinary course was made a three years course. This was chiefly to make the course technically more complete, but partly also to give time for special drill in general science, and in the use of the English language for those who from early disadvantages may be deficient therein.

M. STALKER, *Professor.*

THE LIBRARY.

The library numbers about eight thousand volumes. These have been selected with reference to the wants of the departments, the aim being to build up a working library, which shall furnish the students, who are pursuing investigations beyond the ordinary text-books, with the best authorities and works of reference. It is not the intention of the College to furnish in its library a means of amusement, and while its officers hope to see the students use the books freely, they expect that such use shall be in all cases with a definite object in view. As the student's stay in college is short, and his time consequently of the greatest value, he cannot afford to waste it in the desultory reading even of good books. It is therefore urged upon students that they lay out for themselves courses of reading and study in the library, under the advice of the Librarian, or of some of the Professors. It is urged further that students make frequent use of the books of reference recommended by the teachers of the various college studies. The library is open from 10 A. M. to 12 M., from 2 P. M. to 5 P M., and from 7 P. M. to 9:45 P. M.

MISS CORA MARSLAND, *Librarian.*

GENERAL AND SPECIAL REMARKS.

SPECIAL LINES OF STUDY.

Any person of mature age and good moral character, who desires to pursue studies in any department of instruction of the college, and who is *not a candidate for a degree*, will, upon application to the President, be admitted on the following conditions: (1.) He must meet the requirements for admission to the Freshman class and pass such special examinations as the Professor in charge of the department selected shall deem essential to a profitable pursuit of the work. (2.) He shall confine his work strictly to the line of study chosen at the time of admission, and shall take enough of class work and of laboratory and other practice to be equivalent to the amount of work required of the regularly classified student. (3.) He shall submit to the same requirements in daily recitations and in examinations, with students in the regular courses. Such students will be permitted to room and board in the dormitories of the college if the regularly classified students do not occupy all of the rooms.

Students who have successfully pursued thus a special line of study in the Institution, but not such as to entitle them to graduation, will, upon application to the Faculty, be granted the College Certificate showing their standing in such studies.

HIGHER DEGREES.

Such degrees are conferred upon candidates recommended by the Faculty, in conformity with the following rules:

1. The degree of Master of Science (M. Sc.) is open to Bachelors of Science who are graduates of the Course in Science and Agriculture, and of the Ladies' Course of this College.

2. The degree of Mechanical Engineer (M. E.) is open to Bachelors of Mechanical Engineering, and to Bachelors of Science before 1878, who are graduates of the Mechanical Engineering Course of this College.

3. The degree of Civil Engineer (C. E.) is open to Bachelors of Civil Engineering, and to Bachelors of Science before 1878, who are graduates of the Civil Engineering Course of this College.

4. The degree of Master of Philosophy (M. Ph.) is open to graduates of any of the four-year courses of study in this College.

The Faculty will recommend for the above degrees candidates otherwise qualified who, after taking their Bachelor's degree, shall pursue a two years course of study embracing at least two subjects selected with the approval of the Faculty from the list of post-graduate studies, and shall, during that time, reside at the College for at least one year; and shall pass a thorough examination upon that course, showing in one of the subjects special attainments, and shall present a satisfactory thesis.

Each resident graduate must apply in writing for examination at least six weeks before the annual meeting of the Board of Trustees, stating explicitly the subject in which he desires to be examined, and, at the time of examination, (which may be four weeks before the meeting of the Board,) he must present to the Faculty his final thesis.

POST-GRADUATE STUDIES.

Instruction and opportunities for advanced study are given in the following branches to post-graduate students, provided that undergraduate work shall not qualify a student for a post-graduate degree:

1. Psychology. 2. The Philosophy of Science. 3. Social Science. 4. English and American Literature. 5. The Science of Language. 6. Physiological Botany. 7. Systematic Botany. 8. Zoology and Entomology. 9. Original Designs of Engineering Structures. 10. Veterinary Pathology and Materia Medica. 11. The Principles of Heredity. 12. Applied Mechanics. 13. Agricultural and Organic Chemistry. 14. Physics. 15. Analytical &eometry and Calculus. 16. Horticulture and Forestry. 17. Agriculture. 18. French, German and Latin. 19. History, advanced. 20. Ethics.

EXAMINATIONS, SPECIAL NOTICE.

Examinations for promotion from each college class to the next higher in the course occur only during the last full week of the Fall term and the first week of the Spring term each year. Students who teach school during the winter will be expected so to arrange the time of beginning and of closing their schools as to be present at one of these regular examinations. Students who do not teach will of course be expected to be present. Sickness and actual inability will be held to be the only valid excuses for absence. Special or private examinations cannot be held to suit the convenience of students. To hold them thus would be a damage to all the classes and an injustice to the Faculty. The same general regulations hold good in regard to the examinations at the close of the Spring term in June and at the beginning of the Fall term in July. The success of the College, and of each student in it, depends upon the rigid enforcement of the above regulations.

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